COAL AGE

Vol. 12 NEW YORK, JULY 21, 1917 No. 3

Men! Men! Men!

I HAVE just traveled across the country—up to Alaska and back across Canada. There isn't any really cheap coal in North America. At the present minute there isn't a single market I can find where the supply of fuel is wholly adequate to cover the demand.

I doubt if such a condition has ever existed before, for what is true in North America with reference to fuel is a fact throughout the world. I did not find a mine that was not getting a record price for its output. Seventy-five per cent. of the operators were acting as if they apparently believed the present favorable situation would never end. A small minority, with eyes fixed on tomorrow, were holding down prices and using the moment to build both trade and confidence.

The universal cry was for "Men!" No district and practically no mine has a full crew. In Alaska the Government is offering higher wages than private mining companies can pay, and still is unable to fill its requirements for railroad building. So far as Alaska is concerned, let me say that if our great northwestern territory can develop in the next decade to the point of supplying its own fuel needs, it will have accomplished more than many expect. It will not be a competitor for Pacific Coast markets very soon, if ever.

FUEL OIL is going to be less and less a competitor of coal in the far west. The wells in California are fewer in number and shorter-lived than was expected. More byproducts are being obtained from crude oil than in the past. This development is likely to continue even after the war ends. The result is going to be very high prices for what fuel oil is available. The action of one great railroad in forsaking oil and returning to coal is but the forerunner of similar action on the part of many other railroads and industrial plants. The Washington coal field soon will be asked to supply eight or ten million tons of coal annually instead of three or four million. This field appears to me to have the most substantial future of any field in America.

Returning to the question of labor, that is now and will be more and more the chief problem of the coal industry. A careful investigation leads me to believe that about 1100 new coal mines have been opened in the United States in the past 15 months. All these mines are bidding for men, and they are drawing, not from other industries, but principally from the older mines.

Forty million men have been drafted from productive life and put to the business of making war. At least three men at home are required to devote their energies to supplying the needs of every actual fighter with food and weapons of destruction; which means we have turned the efforts of nearly two hundred million men to destroying civilization rather than to the attainment of any useful ends. No wonder the cost of food has gone up even in China and far-off India.

IF the war is to continue, we in America must now withdraw our quota of men from useful occupations. If we are to do as well as Canada and no better, we must send more than 3,000,000 soldiers to Europe, for we have 13 times the population of Canada.

There are four ways to balance the consequent industrial loss: (1) Be satisfied with a reduced production. This way is least acceptable. (2) Increase individual output by introducing improved methods. (3) Introduce machinery and labor-saving devices. (4) Import labor.

Solutions 2 and 3 are self-evident. Just a word about No. 4: American mines started by bringing over English, Irish, Welsh and Scotch. Then we got some Germans and a few French. Next we imported Italians and the natives of southern Europe, and last we secured the Slavs and Greeks. There remains only India, China and Japan, with China by far the most likely field. I have the statement of many that the Chinese are good miners. The supply is practically inexhaustible. They are going across Canada to France by the trainload. I saw one ship come into Vancouver with 4000 aboard. France is wise. Why can't we follow suit? What do *Coal Age* readers think? Let us have your confidential opinion. If enough of us think the same way, we might make a noise in Washington.

FLOYD W. PARSONS.

Ideas and Suggestions

Friction-Clutch Advantages

Where a plant is not operating at full capacity throughout, all the time, friction clutches are a convenience and an economy. Clutches may be so arranged as to cut off a whole department or any portion of a department. Several of them may be placed on a single lineshaft, if thought desirable. In that way, almost any part of the power may be thrown on or off instantly.

It does no harm to place such clutches in the main shaft. To operate an idle machine is about as costly as operating the same machine loaded, hence the power saving that accompanies the use of friction clutches.

In the old days we stopped machines by throwing off the belt. But we preferred to leave the belt on because of the difficulty and danger of throwing it onto a rapidly running pulley. Consequently, we threw the belt off only when the machine or machines were to be idle for several days or weeks.

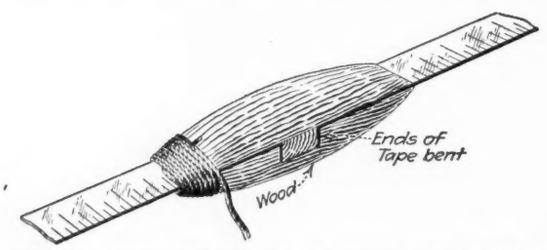
With the advent of friction clutches and their attendant safety and convenience, these difficulties were removed. If you will just test out a machine running "empty" and then "full," you will understand why so many plants are installing a number of friction clutches.

Field Repair for Broken Steel Tape

By Samuel Warren
New York City

From time to time there appear in the engineering magazines, methods of repairing a steel tape in the field. Most of them will slip without entirely pulling apart and are a constant source of worry. The method outlined below is guaranteed not to slip.

Heat each of the broken ends with a match, drawing the temper for about a quarter of an inch, so that it will bend without breaking. Slip the end between the



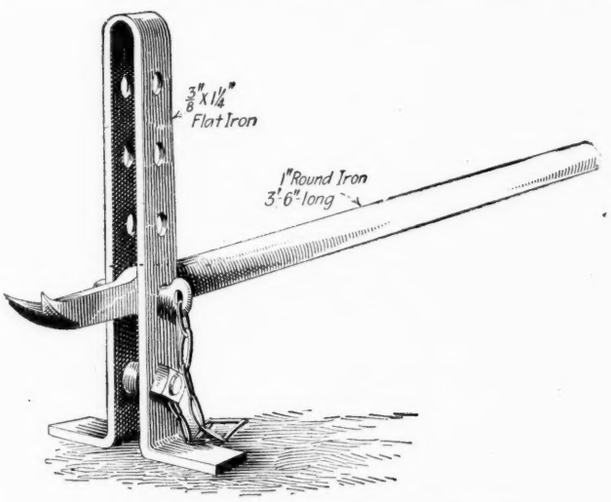
REPAIR LIKE THIS MAKES SLIPPING IMPOSSIBLE

blades of your knife and bend to a right angle. Then proceed to mend it by splitting a small stick and making notches in one-half to take the bent ends. Wrap with a piece of twine after tapering the ends of the stick so that it will not catch in the brush. Then proceed to chain—and don't worry as to whether your tape has stretched at the splice.—*Engineering News-Record.*

Coupling-Pin Puller

By William Fleming
Winburne, Penn.

The coupling-pin puller here illustrated has proved its value as a time saver where coupling pins are liable to get bent in service. While the idea is not new, devices of this nature are but little used about the mines. Where it is desired to cut the trip quickly, such as at the foot of a shaft or slope, or on planes or tipples, this



THIS COUPLING-PIN PULLER A TIME SAVER

device will soon demonstrate its effectiveness. The lever should be made from 1 in. round iron about 3 ft. 6 in. long, while the frame, which should be about 12 in. or more in height, may be built from ⅜ x 1¼-in. strap iron. Of course, these dimensions should be varied to suit conditions, but they will be found to be approximately the average.

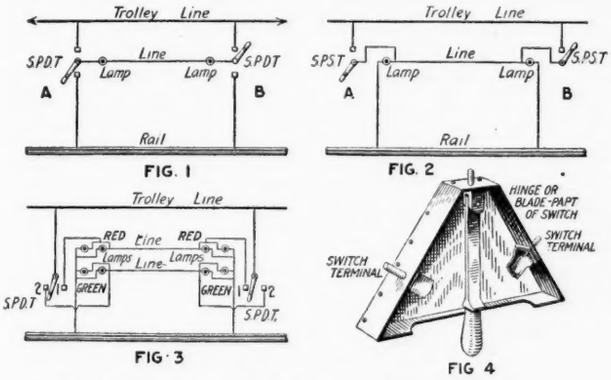
Block Signal System for Coal Mines

By Frank Hoskinson
Victor-American Fuel Co., Delagua, Colo.

One of the most important applications of electricity in coal mining is the electric signaling system, of which a number of different types are in use in coal mines today. The system illustrated in Fig. 1 is one most frequently encountered, and employs electric lights as the warning medium. The disadvantage inherent in this scheme of signaling is that if one of the lamps should burn out the entire system is out of order, which happens quite often where the lamps are installed in series.

As may be seen in Fig. 1, a single-pole double-throw switch and a lamp of the proper voltage are placed at each end of the system. The lamps are connected in series by an extra wire strung between the two

partings, or sidetracks. The trolley line at each end is connected to the upper part of the switches, the bottom being connected to the rail. The hinge, or blade, is connected to the lamp. The motorman coming in at *B* throws the switch to the up position, and if the motorman at *A* has passed the switch and left it in the down position, the motorman at *B* will get a light. In addition the bulb at *A* will light up, signaling the motorman there that the other locomotive is on the way and is past *B*. The man at *A* will consequently wait until the motor from *B* arrives. The same arrangement is, of course, in effect if the motor arrives at *B* first.



FIGS. 1 TO 4. SOME PRACTICAL SIGNALING-SYSTEM INSTALLATIONS

A multiple wiring system of signals that is used to a considerable extent around the mines is shown in Fig. 2. It is not so reliable as the one shown in **Fig. 1,** for if the line wire is broken the motorman at either end will get the same light as if the line were in good shape. This may result in a collision. Fig. 2 shows a single-pole single-throw switch at each end, also a lamp. The trolley at each end is connected to the top part of the switches, and the hinges or blades to the line wire. The line wire is also connected to the lamp, the other side of the lamp being connected to the rail. The motorman coming in at *B* puts in the switch. This lights the lamp at either end, or if a motorman reaches the point *A* first, he puts in the switch and stops the man at *B*.

In Fig. 3 is shown one of the best and safest signal systems of which I know. The idea of this system is my own as far as I am aware. This block signal system will be positive in action as long as the motormen attend to the proper throwing of the switches.

Fig. 3 shows a single-pole double-throw switch at each station and two sets of lamps, two lamps wired in multiple for each set. One set of lamps at either end is green, and the other set is red. The end, or blade, of each switch is connected to the trolley line, while contacts marked 1 on each switch are connected to the top side of one of the line wires and its lamps. The contacts marked 2 are connected to the other line and lamps. Two line wires are run between the signals. The other side of the lamps are both connected to the rails at either end.

A motorman arriving at the point *B* puts the switch onto contact 1. If the switch at *A* is on contact 2, both sets of lamps will light up; but if the switch at *A* is on contact 1, both sets of lights will be burning when the motorman arrives at *B*. This warns him that the other motor is coming.

In this system of signals if the motorman arrives and finds both sets of lights burning, he is blocked, and if there is only one set of lights burning he must throw his switch to the proper direction and get both sets of lights burning before he has a clear road. If either or both line wires are broken, a motorman cannot get a clear road; or if the line wires are short-circuited or a connection is broken at either end, he cannot get a clear road. He may also learn from the way the lights behave that there is something wrong. A study of the diagram or experiment with an easily constructed model of this signal system will soon convince one that it is one of the best signal systems that can be installed in a mine.

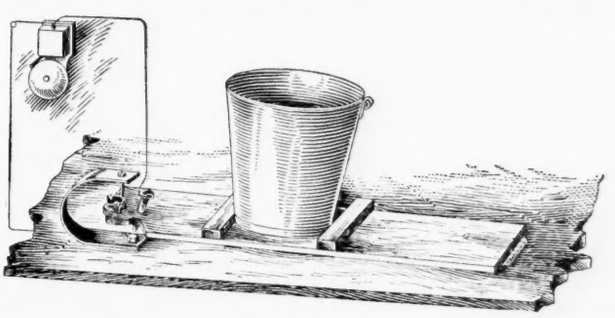
With regard to a suitable single-pole double-throw switch, I have a number of such switches in operation that are giving perfect satisfaction. Probably the most convenient switch for the purpose is the one shown in Fig. 4. Such a switch can be easily made and is entirely safe to handle. A triangular box of suitable dimensions is first made to hold the switch. This is arranged so as to allow the removal of the cover whenever it is found that repairs or adjustments are necessary.

The metal parts are inclosed, and the only opening is a slot at the bottom sufficiently long and wide for a suitable handle to be moved in it through the proper distance. A switch of this type should be installed so that the switch handle is always thrown in the direction in which the motor is traveling. It should be so located as to be easily thrown by the motorman as he goes by, thereby allowing the locomotive to pass on without stopping if the signal is not set against it when it arrives at the switch.

Alarm When Oil Pail Is Full

BY THOMAS P. CADEN
Fall River, Mass.

The illustration shows an alarm intended to prevent waste of oil from the receptacle overflowing. The material necessary for the construction of the device may be found in almost any plant and consists of the following: 1 board about 18 in. long by 12 in. wide and 1 in. thick, a 2½-in. No. 8 wood screw, 1 strap hinge, 1 small screw hook and eye, 1 curved spring and one electric bell or buzzer as shown. Wood cleats are nailed to the board, so that the pail will always be placed in the same position. The screw can be adjusted so contact can be changed to suit pails of different size. The number of quarts or gallons can be tallied by adjusting the contact screw for an even number of quarts.—*Power.*



PLATFORM LOWERS WHEN WEIGHTED, CLOSING CIRCUIT

Observations on Modern Coal Washing

By G. H. ELMORE
Philadelphia, Penn.

SYNOPSIS—*The tendency in coal preparation is strongly toward washing. The tendency in washing jigs is toward larger and heavier machines. The jigging of anthracite and bituminous coals are two distinct problems. Much has been accomplished in the way of improvement in coal washing in the past few years.*

THE preparation of coal by the jigging process has been making decided progress during the past few years, both in the anthracite and bituminous regions. This progress has embraced not only an improvement in design, but a decided tendency toward building machines of large capacity. The improvement in design has consisted largely in making the machine much heavier, in order to make every part of the best construction for the purpose it is intended to serve. In other words, it has been profitable to build jigging machines of the best material and sufficiently strong in all details so that breakdowns shall be impossible. This idea has been followed without particular regard to cost.

Undoubtedly the greatest single advance made in the art of jigging has been the development of the automatically controlled machine. It has been the aim of designers for several years to build a jigging machine that would practically eliminate hand-control. Not until within the last year or so, however, has this been attained.

The jigging of coal in the anthracite fields of Pennsylvania, and in the soft-coal regions of the balance of the world, are in many respects two distinct operations. They will therefore be here treated separately.

The general tendency in the anthracite fields of Pennsylvania is toward a general adoption of the jig in coal preparation. There are still localities where the dry process can be more profitably employed. Many of the larger companies, however, are rapidly adopting the jig as the best and most economical means for removing the impurities from the output. The labor problem has done much to force this procedure. Nothing apparently so simplifies the labor situation in anthracite breakers as the installation of jigging machines. This is doubly true since these machines have now been made automatic in their operation and have been developed to handle sizes ranging from broken or grate down to the buckwheats.

There is the still further fact, and one of considerable importance, that an up-to-date anthracite jigging machine will not only produce a clean coal in the various sizes sent to market, but will at the same time make a cleaner refuse than can be obtained by the old system of hand-picking by boys. Preventing the coal from finding its way into the slate bank, when accomplished by up-to-date jigging equipment, furnishes an item which, expressed in dollars and cents, is surprising.

There has never been any tendency on the part of slate bank inspectors to overestimate the amount of coal delivered to the bank. Under the old system of hand-picking, the reports of these officials would show coal in the slate bank varying from 2 or 3 per cent. up to 10 or 12. But it is well known that in some of these banks it would not be difficult to find from 12 to 20 per cent. of good coal. Within recent years this situation has been rapidly improved, and the time is not far off when a slate bank will be indeed a slate bank.

As to the saving in labor effected in an anthracite breaker of large capacity, where highly efficient, automatic jigging machines are employed, a concrete illustration will be interesting.

The No. 6 operation of the Pennsylvania Coal Co., located near Pittston, Penn., until the month of January, 1917, employed in the breaker an average of 105 men and boys. The installation of four modern, automatic jigging machines of large capacity was then begun. All other types of machines, including pickers, elevators, chutes, conveyors, etc., were removed. The result was that during the month of May the breaker was making a larger production than ever before in its history, the product was passing standard inspection, the proportion of coal in the refuse was less than ever before, and all this work was being accomplished by 35 men and boys. The simplification of the breaker equipment was so great that it could hardly be recognized as performing the same duty. This meant less upkeep, less power consumption and fewer breakdowns.

A Jig May Be Used as a Rougher

Another innovation in the anthracite field is the use of a large-capacity heavy jigging machine as a "rougher." The use of machines for this purpose is now restricted to the recovery of some of the culm piles, many of which contain a large proportion of rock. These jigging machines give the material a preliminary treatment and remove the larger portion of this rock, allowing the better part to go into the breaker for final treatment and preparation.

The economy of this operation is at once apparent; wear and tear on crushing machinery is immensely relieved, owing to the primary rejection of this hard and bulky material before it comes to the crusher. The capacity of the breakers themselves is greatly increased because this material is not taken into the breaker. There is, consequently, substantial economy throughout the entire process.

It is probable that this system of using a roughing jig for rejecting the large, coarse slate will be adopted for handling the freshly mined coal at those mines where a large amount of rock comes out with it. Such a machine will be employed early in the preparation process and will reject this rock before crushing.

The problem of reducing breakage on the prepared sizes continues to receive careful consideration. This is being attained by the more general introduction of properly designed chutes, the simplification of plants and particularly by the use of a large overflow type of jig operating with a comparatively short stroke and producing much less bed agitation, and therefore largely

reducing the wear or attrition of the coal as it passes through the machine. This is in marked contrast with the much smaller jigging machines operating with long strokes and with violent bed agitation, and the removal of the coal from the machine by various types of drag conveyors.

The expense entailed through breakage on jigging machines has, until a comparatively recent time, amounted in many breakers to over 5c. per ton on the prepared sizes and in some cases has run much above this figure.

So far as bituminous coal is concerned, the improvement of this material by the jigging process can properly be divided into two groups of operations—those where the coal is to be used for fuel purposes and those where it is to be employed for producing metallurgical coke.

From the standpoint of plant design for these two groups, the equipment required is usually quite different. In most soft coal fields the requirement for a good fuel product demands the removal only of the heavy refuse—that is, the slate and rock. There are, however, some fields where the amount of bone coal present is so large that operators sometimes find it to their advantage to remove this bone product. This brings the design of the plant closer to that desired for the production of metallurgical coke.

In a broad sense, two types of jigging machines exist. First, those that make a two-part separation—refuse and clean coal. Second, those that make a three-part separation—refuse, intermediate coal and low-ash coal.

When the two-part separation jig is used, the operator has the choice of throwing the bone or intermediate product either into the refuse or into the coal that goes to market. With the three-part separation jig, the operator may make a fuel for his own plant of the intermediate coal, or he can retreat it on a separate machine, making a two-part separation and throwing the best of it into the marketable product, rejecting the high ash portion to the final refuse. Or, still again, he can recrush this intermediate product, freeing the good coal from the high ash material through retreatment on a separate machine, making a good product of clean coal and a refuse product sent to final rejection.

The question as to whether or not the three-part separation jig should be employed for the preparation of coal for fuel purposes depends entirely upon the character of the product coming from the mine.

In coal washing, the burden of the final success of the operation rests almost entirely upon the jigging machines. There is no difficulty in designing transmission, elevating and conveying equipment so that it will give satisfactory service, but the real cleaning of the coal, the accomplishment of the object for which the plant was built, depends almost entirely upon the jigging machines; and here, again, the adoption of large automatically controlled jigs has much simplified the problem of building a coal-washing plant, making doubly sure its successful operation and the attainment of the object of its construction.

One of the most important improvements in the design of a modern, soft-coal washery has been the introduction of equipment for more perfectly saving the fine coal. Formerly it has been the common practice to allow the fine coal to pass out together with large volumes of water. This material thus finds its way into valleys below the plant and into convenient streams. It was taken as a matter of course that such a loss must

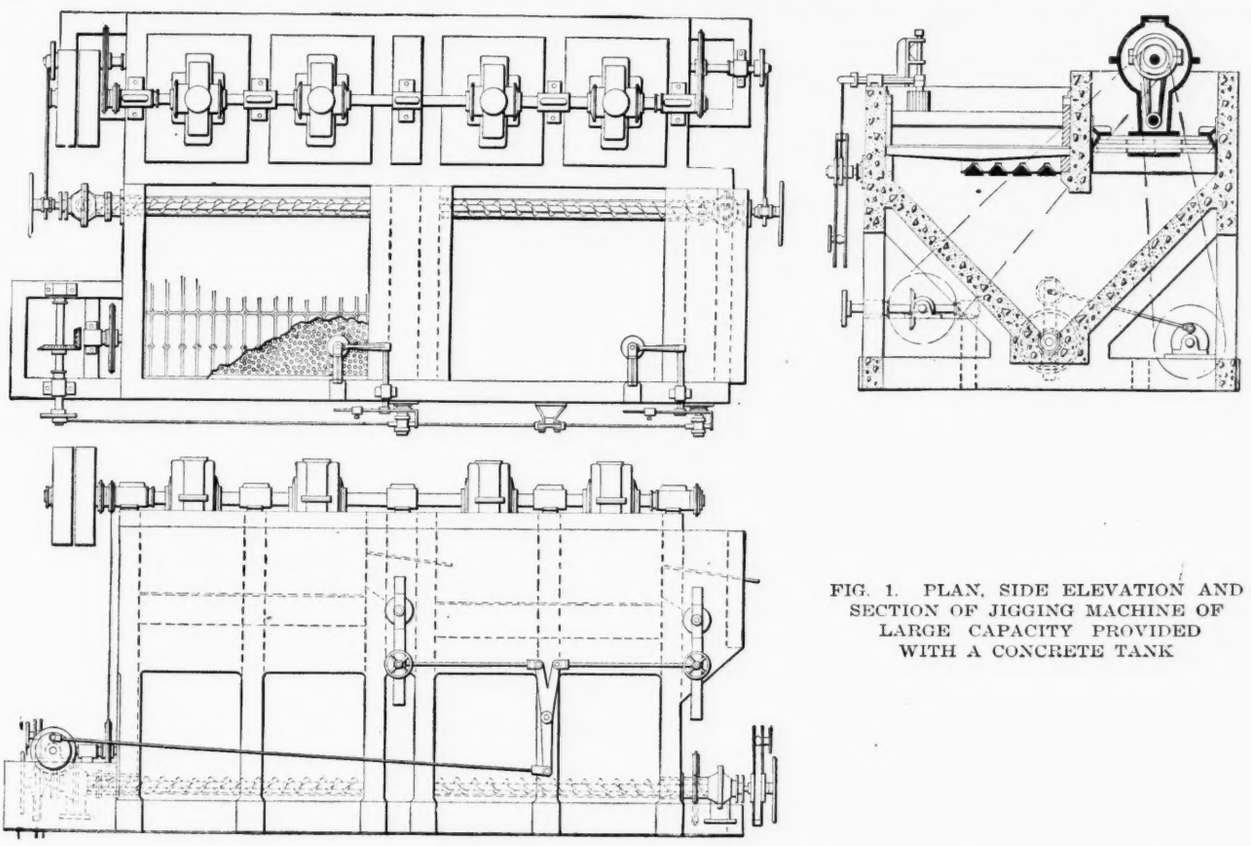


FIG. 1. PLAN, SIDE ELEVATION AND SECTION OF JIGGING MACHINE OF LARGE CAPACITY PROVIDED WITH A CONCRETE TANK

be expected and no serious attempts were made to prevent it. It is only within recent years that any serious endeavor has been made to stop this loss. But this result has been accomplished in a remarkable degree in some recently built plants; in fact, so perfectly has this been done, that it is almost true to say that there is practically no loss of fine coal whatever. The saving in dollars and cents thus accomplished is a large item.

I was recently informed by the consulting engineer of one of the large operations in Alabama, which during the past three or four years has given special attention to this problem, that during the year 1916 about 13,000 tons of good fuel, which had heretofore been permitted to go to waste in the manner just described, have been recovered from certain of its various operations. All of this company's operations where washeries are used are being equipped with proper apparatus for accomplishing this result.

Modern blast-furnace practice demands good coke, not only structurally but chemically. Some ideas formerly well accepted as to positive requirements for a good metallurgical fuel have been materially modified. Among them is the idea that a coke must contain approximately 10 per cent. of ash in order to have good structure. The tendency today is to reduce the ash just as far as possible. Low ash is naturally accompanied by a low sulphur content.

The economy in the production of pig iron due to the use of a low-ash coke need not be discussed here. It is enough to say that it is probable that the saving in cost of pig produced varies from 15c. to 20c. per ton for each unit reduction of ash in the coke employed.

The design of a modern coal-washing plant for the preparation of coal for coking purposes involves a careful preliminary study of the coal itself. This investigation must first determine the ultimate possibilities of the coal for producing a low-ash, low-sulphur coke. This determination is made by the well-known "float-and-sink" method and involves a careful study of the results obtained from various specific gravity solutions with coal which is crushed to pass through various sizes of round holes. For instance, determinations are made on all the coal treated and prepared to pass, first through a 1½-in. round hole, then a 1-in., then a ¾-in. and finally a ⅝-in. hole.

When the results obtained from this series of tests are analyzed it will be possible to determine the size to which the material should be crushed in order to free the largest percentage of ash and sulphur from the good coal, the approximate percentages of final refuse, intermediate product and good coal that will be produced and the specific gravity at which these divisions should be made. In other words, the economic points involved in the problem may be determined.

Modern plants in the coking field are universally making a three-part separation. Some of them are making a four-part separation, with the following ends in view:

First, that the refuse rejected may be, in fact, nothing but refuse.

Second, that whatever intermediate product may be present in the coal (and by "intermediate product" is meant that portion of the mine output that is too high in ash to be put into the coke and still has too great a fuel value to be sent to the refuse) may be disposed of to the best possible advantage, the exact nature of this disposition to be determined by the conditions at each operation.

Third, the production of the lowest possible ash and sulphur coal for coke making.

The development of the modern jigging machine has played a highly important part in working out this problem. When the demand for low-ash coke for blast-furnace use became urgent about five years ago, and the problem was put up to the builders of coal-washing equipment, one of the conditions was that the plants must handle a large percentage of fine material, it having been found that comparatively fine grinding was necessary in order to free the ash and sulphur from the coal. At that time I conducted a series of experiments, collaborating with Robert Hamilton, consulting

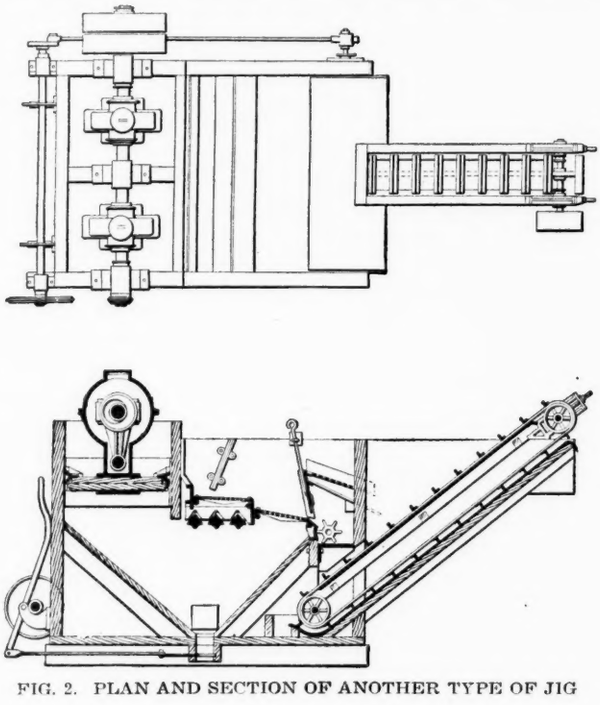


FIG. 2. PLAN AND SECTION OF ANOTHER TYPE OF JIG

engineer, and Dr. R. H. deHoll, chief chemist of the Tennessee Coal, Iron and Railroad Co., of Birmingham, Ala. The result of these experiments was the development of large jigging machines that would successfully operate under a heavy feed of fine coal.

The first plant of this character designed along strictly modern lines with a view to handling finely crushed material and saving the coal slimes was built by the company mentioned above at its No. 8 operation near Birmingham, where all coal was crushed to pass a ¾-in. round hole and 60 per cent. of it to pass through a ⅛-in. round hole. This character of material is sent to the jigging machine at the rate of from 50 to 75 tons per hour, with the results that not to exceed ½ per cent. of good coal that is fed to the jigging machines is lost in the final refuse and that the coal produced for making coke runs by yearly average close to the ultimate theoretical conditions as to ash and sulphur that were shown possible by the preliminary float-and-sink tests made when the problem was attacked.

The disposition of the intermediate product may be made in any one of several ways:

First, it may be used about the operation, under boilers for producing steam, in gas producers, or at any other point where the burning of a comparatively high-ash coal is permissible. If the washer is located near a steel plant, opportunities of this kind are many. Where the percentage of this intermediate product is not excessive, and power is produced at the mine by burning coal under boilers, it may profitably be used for that purpose.

Second, at certain markets this product can be sold as a high-ash coal. This is being done in the State of Washington, where many of the coal beds contain a large percentage of this intermediate product.

Third, it may be retreated on separate jigging machines—the better portion being sent to the coking product and the high-ash portion to the final refuse. It is sometimes profitable to recrush this product before passing it to the retreating jig, as the coal and refuse may thus be more easily freed from each other.

It may be interesting to note that the handling of this finely crushed material on jigging machines employing no foreign substance as a bedding is entirely an American development. The European practice always has been, and still is, the maintenance of a jigging bed of feldspar or other heavy material, the separation of the fines and passing them by the jigs without any treatment whatsoever. Nothing has been more clearly and conclusively demonstrated than the possibility of building and operating large-capacity jigging machines that will handle this finely ground material, maintaining their own beds from the coarser refuse that comes to them, and at the same time preventing the loss of practically any good coal, as is shown at the operation of No. 8 mine referred to. Since the No. 8 plant was put into commission other large plants have been erected, and still others are now building.

Another Innovation

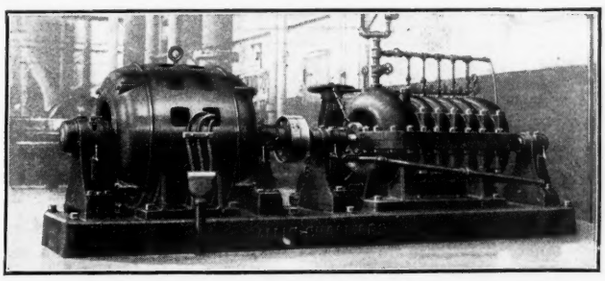
Here another innovation deserves mention. This is the use in the field of coal washing of a concentrating table, similar in general design to those that have proved so highly useful in the art of concentrating ores. The particular utility of this device is found in handling finely ground coal; that is to say, coal that will all pass through a ¼-in. round hole, or even finer. This much may be said from the standpoint of the jigging operation—namely, when all the feed to the jig is ground to ¼-in. or finer, the operation becomes delicate, if not difficult. When it is all ground to ⅛ in. or finer, it becomes practically impossible from the commercial standpoint. When it is all ground to ¾ in. or ⅝ in., the operation of the jigging machine is entirely practicable.

When these coarse particles are reduced in size to about ¼ in., commercial jigging, on a large scale, with large tonnages on each machine, becomes impracticable, owing to the difficulty in preventing "boiling" of the bed; and the jigging of this class of material on a feldspar bed is unsatisfactory because of the large losses of coal in the refuse. It has been found that a concentrating table may be used at this point, taking up the task quite satisfactorily. The capacity of such machines varies from 8 to 10 tons per hour, depending on conditions, which, while only about 20 per cent. of the capacity of the modern jigging machine, permits the table to become a useful piece of apparatus.

High Head Acid-Resisting Pumps

There is an interesting mine-pump installation at the Hampton colliery of the Delaware, Lackawanna & Western Coal Co., near Scranton, Penn. This pump handles mine water containing sulphuric acid, consequently all the parts coming in contact with the water are made of an acid-resisting bronze of a composition which has been found to best withstand the action of this strongly acidulous fluid.

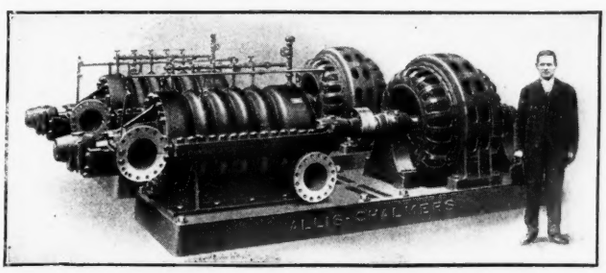
The machine itself is a 16-in., six-stage, horizontal shaft, split-casing pump, consisting of two 3-stage pumps mounted on a common base and connected in series by piping from the discharge of the first-stage pump to the suction of the second-stage pump. The



EIGHT-INCH SIX-STAGE CENTRIFUGAL PUMP
Direct connected to a 290-hp., 440-volt, 25-cycle, 3-phase, 1450-r.p.m. squirrel-cage motor, having a capacity of 1000 gal. per min. and working against a head of 815 feet

pumps are placed so that the end thrust on the impellers in one pump is balanced by the thrust on the impellers in the other pump, the pump shafts being connected by a solid coupling. In addition to this hydraulic balance, a marine-type thrust bearing is used at the end of the outer pump shaft. The pump is driven by a 1000-hp. slip-ring induction motor at a speed of 705 r.p.m., and at this speed the capacity is 5000 gal. per min. against a total head of 500 feet.

This pump was built in 1909 and has been in continuous service up to the present time, only the replacements



TWO 10-INCH, SIX-STAGE SOLID-BRONZE MINE PUMPS
Driven by 325-hp., 440-volt, 25-cycle, 3-phase, 730-r.p.m. wound rotor motors. Each unit discharges 3000 gal. per min. against 298 ft. head

which might be expected from this length of service having been furnished during this period. The performance of this machine is largely responsible for the installation of eleven other bronze pumps of a similar design during the current year.

It is important in the use of mine pumps handling acid water not to operate the pumps at too high a speed. Lower velocities of water leaving the runners seem to increase the life of the pumps since acid water traveling across the metal surfaces at a rapid rate appears to have a much greater action than when moving slowly.

Ball-Bearing Motors in Modern Mine Equipment

By ROBERT HIRSCH
Hartford, Conn.

SYNOPSIS — *Ball bearings in various types of mining machinery are becoming quite popular. Their use results in increased efficiency, decreased wear, decreased attendance and a decided diminution in bearing troubles.*

NO OTHER single improvement made in the last few years has increased the ruggedness and economy of motors so much as ball bearings. When first employed on machinery in and around coal mines the ball bearing was looked upon with suspicion. But the success and satisfaction obtained everywhere by the users of ball bearings has now firmly established the worth of the ball-bearing motor.

In considering the change which has taken place by the substitution of ball bearings for plain bearings in electric motors and generators it is natural that we ask, "Why has this change been made?" For it is a fact that every day the ball-bearing motor is finding use in new fields.

For their successful operation, plain bearings depend upon the maintenance of an oil film between the shaft and the bearing lining. When this oil film is broken the metal surfaces of shaft and lining rub against each other. This causes friction, heating and wear. The harder metal of the shaft tears into the softer bearing metal, or the shaft becomes scored. Two metals making rubbing contact must always produce this result. Of course, the greater the pressure between the rubbing surfaces the greater will be the friction.

Referring to the curve in Fig. 3, it will be seen that for every speed there is a definite load above which the oil film breaks. For example, at 600 r.p.m. the load on a plain bearing must not exceed 130 lb. per sq.in. of projected area, and at 1200 r.p.m. it must not exceed 165 lb. or the oil film will break. This curve was determined by a large maker of electrical machinery and gives maximum loads permissible with a perfect oil film. Where the oil film is not perfect lower loads will naturally cause breakage of the film with resultant increased friction.

On the other hand, ball bearings do not depend on an oil film to keep the bearing surfaces apart. The load is carried by steel balls, which, in all high-grade bearings, are made of selected metal, hardened throughout and ground to microscopic accuracy. The oil in a ball bearing cannot be squeezed out because it is not under pressure. It is used only to protect the highly polished balls and races. As the bearing revolves it is bathed by the oil.

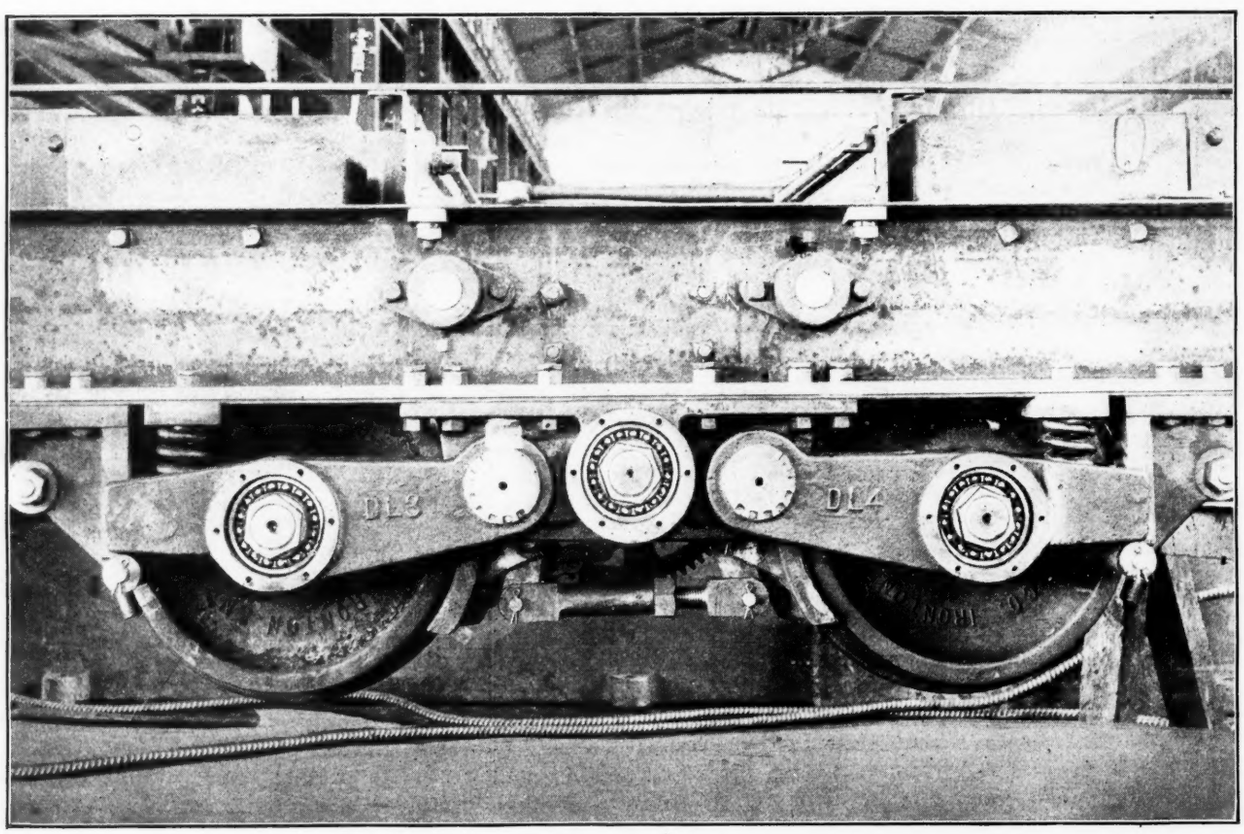


FIG. 1. BALL BEARINGS ON A MINE LOCOMOTIVE

In a ball bearing (designed properly as all high-grade commercial bearings are) there can be no sliding. The hardened steel balls, perfect spheres, roll on races of selected, hardened steel. The races are also hardened uniformly through and through. Casehardening or carburizing has been found to be unsatisfactory, since the hardening does not penetrate to a uniform depth. Thus, in ball bearings, hardened steel balls roll on hardened steel races, protected by an oil bath.

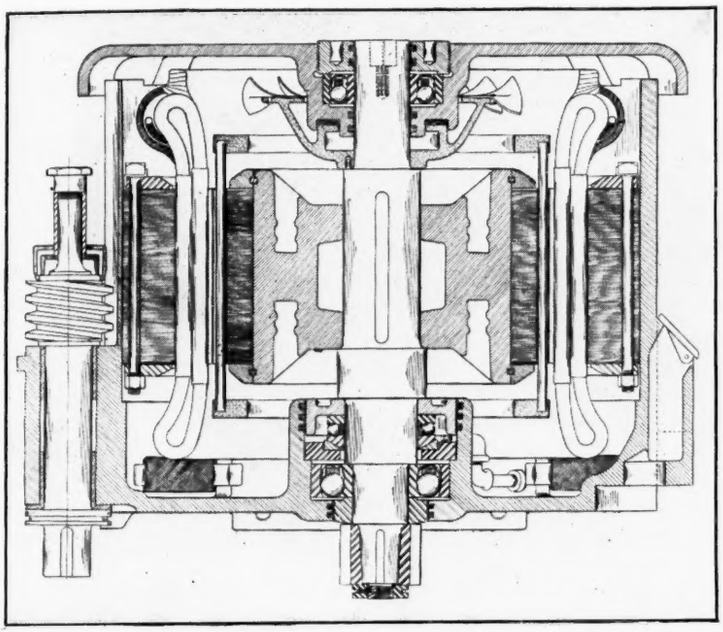


FIG. 2. BALL BEARINGS ON THE SHAFT OF A MINING MACHINE

The advantages pointed out in the foregoing are the real reasons for the growing use of ball-bearing motors. In practice these reasons are stated somewhat differently. Ball-bearing motors are superior to plain-bearing motors because: (1) They consume less power and are therefore more efficient; (2) they do not run hot, therefore hot boxes are eliminated; (3) there is no bearing wear, consequently no armatures rubbing on the pole pieces; (4) the lubricant is not forced out of the bearings, consequently but little oil is required.

It should be noted here that it is easy to house ball bearings oiltight and dustproof. All ball-bearing motors are so arranged; oil cannot leak out, dust cannot get in. Thus a ball-bearing motor needs oil only once every six months, or at even longer intervals.

Now let us see what these advantages mean to the mine superintendent who is looking for reliable equipment. They will be considered point by point.

More efficient motors driving locomotives, tipples, fans, pumps, washers or other machinery mean money saved whether power is generated at the mine or purchased. With the price of producing coal steadily advancing, it is imperative to use every machine of proved efficiency. The ball-bearing motor is such a machine.

Ball-bearing motors are free from bearing troubles. Ordinarily a hot bearing can cause untold difficulty. A stripped armature or an oil-soaked commutator may be the cause of avoidable delay. Not only are time and money lost while the motor is idle, but there must be an additional outlay to repair the worn or ruined part. It is evident that it is to the interest of the superintendent to specify the ball-bearing motor for all his equipment, to avoid this needless trouble and expense.

The lubrication of motor bearings is often neglected in mines. Plain-bearing motors cannot stand such abuse. After a few weeks without fresh lubricant the bearings will wear. Ball-bearing motors, on the other hand, hold a supply of oil sufficient for months of operation. The chamber that holds the bearing is also a lubricant container. This greatly simplifies the lubrication problem, because the ball-bearing motor needs oil replenishment only seldom. A compact motor is especially desirable in coal mines. The ball-bearing motor is especially valuable on mine locomotives where the narrow track gage limits the motor width. Here the ball bearing permits the use of a larger and more powerful motor. When a motor transmits its power through gears, as in a mining locomotive, it is essential to have these gears always in perfect mesh. Wear in the armature bearings will allow the motor pinion to pull slightly out of mesh, and the gear teeth then no longer touch at the pitch circle. This permits rapid and destructive wear. But by equipping both motor and gear reduction with ball bearings, bearing wear is almost entirely eliminated and the gears are held accurately in their correct relative positions. There can then be no spreading apart of the gears and no wear or trouble from this source. To the average man such a detail as bearings may seem too small to consider. However, the discerning purchaser of mine equipment obtains reliable machinery by attention to trifles.

Too often a good piece of machinery is made useless by trouble arising from poor bearings. Failure of a builder to embody the most suitable bearing in his design often means failure of the machine in service. Leading builders of electrical equipment are building ball-bearing motors for all mine purposes because the ball-bearing motor has proved itself superior to the plain-bearing machine.

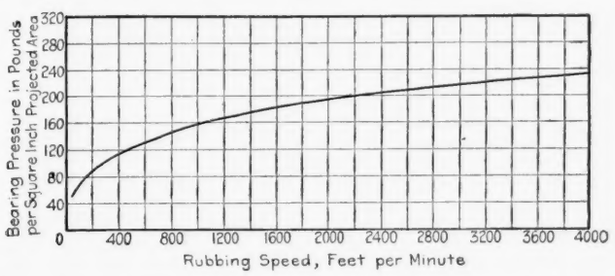


FIG. 3. PERMISSIBLE PRESSURE AND SPEED IN PLAIN BEARINGS

Specific bearing problems which may be troublesome to the inexperienced operator may be solved by referring to the engineers of any reliable ball-bearing manufacturer. These are the men who have had wide experience with bearings, and their knowledge is at the disposal of any mining man who is in need of it.

Mining Machinery as a Factor in the War

SYNOPSIS—*A review of the importance of proper mechanical equipment in maintaining production and a brief survey of the modern cutting and haulage apparatus. Great Britain places the manufacturers of mining machinery among those entitled to receive the first consideration in the matter of supplies.*

THE production of bituminous coal in the year 1877 was 35,000,000 short tons. Since that time, it has, on an average, doubled in output every eleven years. The output for the current year is estimated at 700,000,000 short tons.

From the statistics of coal production, taken from Bulletin No. 115, Department of Interior, Bureau of Mines, we find that during the period from 1891 to 1914, the average tons of coal mined per mining machine, per year, in the United States is about 13,700.

We find also that in 1913 there were 2208 shortwall mining machines in use and in 1914 there were only 3024, an increase of 32 per cent. in one year. Judging from the present condition of business, the current year will show an even more surprising increase. In 1914 there were 6859 breast machines in use, which is an increase of 100 per cent. over the year 1904.

One of the most noticeable increases in coal production mined by machines has been in Kentucky, where, in 1912, 66.4 per cent. of the coal was mined by machines, while in 1914 the production mined by this method was 77.2 per cent. It is reasonable to believe that these percentages have increased very materially during the last two years.

The report referred to also states that there has been a very marked increase in production per man during the last 25 years, which is attributed to the increased number of mining machines used.

Careful consideration of the use of mining machines and electric mine locomotives will convince the most skeptical that it is of utmost importance that the production of these should be increased to meet the increasing demand for coal, which is so essential for keeping our munition factories, battleships and transports up to their maximum efficiency. The manufacturers of this apparatus should be given every consideration possible by the Government and placed in the same class with regard to importance of production as the producers of munitions, battleships and airplanes.

In England, the manufacture and maintenance of coal-mine apparatus has been placed in Class A, which is the same as industries engaged in the production of munitions, and the Government has issued to coal operators, managers of mines and manufacturers of mine apparatus a permit which makes it possible for them to secure adequate supplies of raw material, quick production and rapid transportation.

In order to give the reader a conception of what the manufacturers of coal-cutting machines have accomplished in the last 40 years, we will describe and illus-

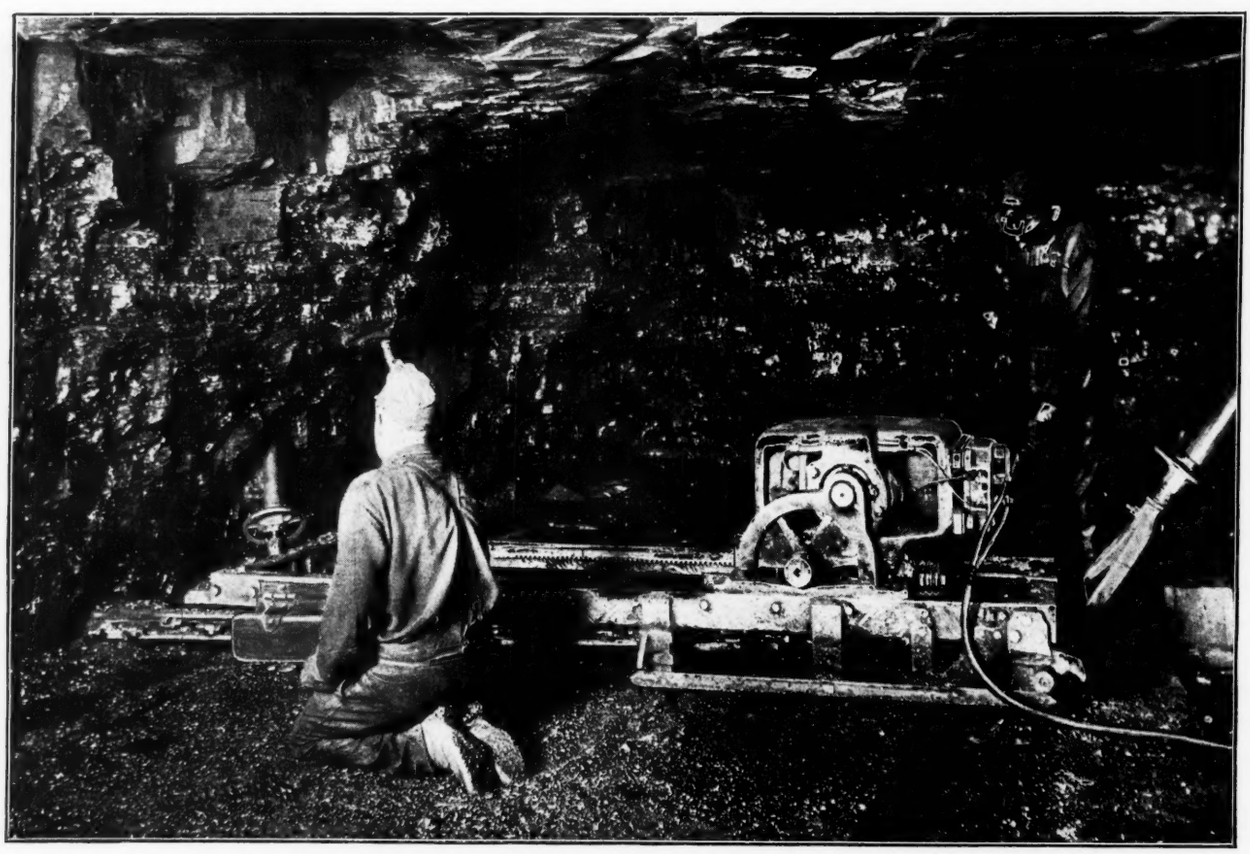


FIG. 1. STANDARD TYPE OF BREAST MACHINE EQUIPPED WITH 35-HP. MOTOR AND CAPABLE OF MAKING A 7-FT. UNDERCUT

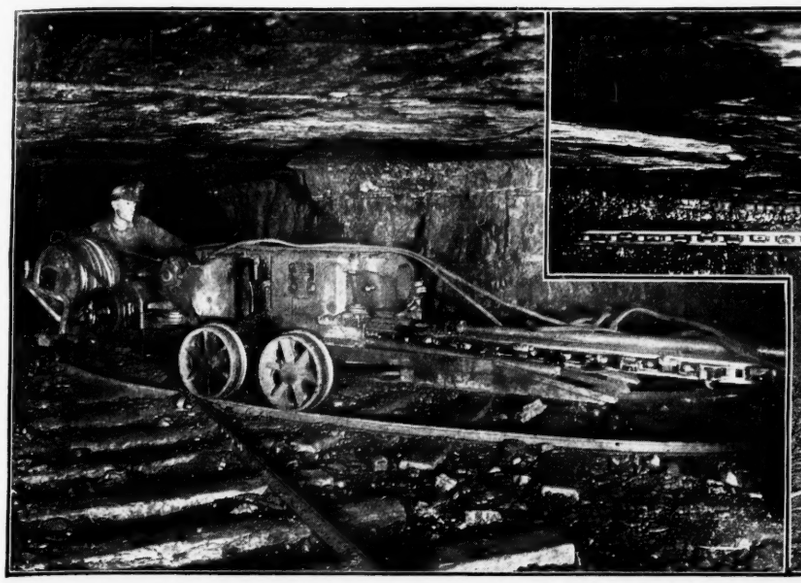


FIG. 2. SHORTWALL MACHINE WITH SELF-PROPELLING TRUCK AND AUTOMATIC CABLE REEL

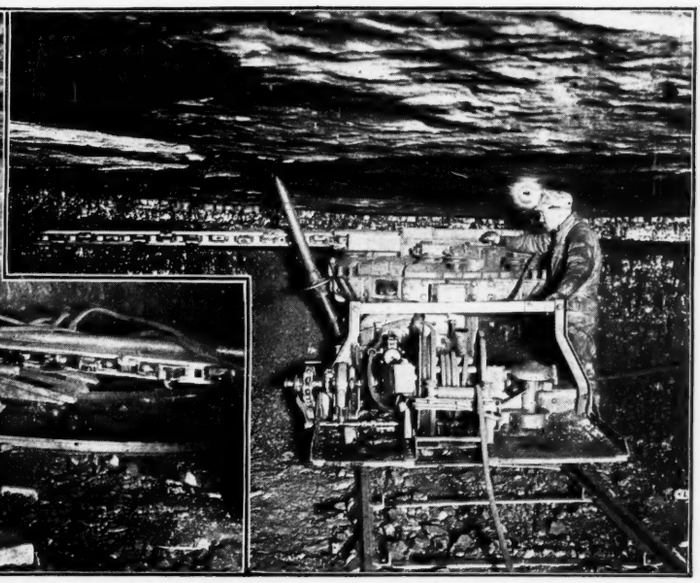


FIG. 3. TOP-CUTTING MACHINE FOR CUTTING DIRT BAND AT TOP OF SEAM

trate the mining machine and the electric mine locomotive of today, which has made possible the enormous outputs from our coal mines.

The breast machine and shortwall mining machine are the two most popular types of undercutting machines in use today. The breast machine is illustrated in Fig. 1. This machine consists of an outside stationary frame and a movable cutter-bar frame upon which is mounted a steel carriage together with the gearing and the motor which drives the machine.

Machines Are Self-Propelling

The up-to-date machines of this type are self-propelling. A truck is provided to which power is transmitted by the same motor which drives the machine. By this means the machine is propelled from one working place to another. To put the machine in position for undercutting, it is necessary to unload it from the truck by means of a crowbar. The machine is pulled over to the face toward the left-hand rib, and when in position, the outside frame is jacked solid to the floor by means of front and rear jacks, as illustrated. After the machine is jacked solid, the motor is started and the cutting frame is fed into the coal.

The cutting element consists of an endless chain which travels around the periphery of the cutting frame. The chain is made up of solid and strap links, and the bits are staggered. When the chain revolves, the bits cut a slot, or kerf, wide enough to permit the cutting frame to enter the coal face. The cuttings are dragged from under the coal by the movement of the chain and bits, and are shoveled out of the way by a helper.

The ordinary width of cut for this type of machine is 44 in. After the cutting frame is fed forward its complete depth, which is usually from 6 to 7 ft., the motor is reversed and the cutting frame fed out from under the coal.

The next operation is to take down the jacks and by means of a crowbar shift the machine the width of the cutting frame and again jack the outside frame solid to the floor and repeat the operation of undercutting. The machine runner is required to move this type of machine by hand as many times as it is necessary to cut the full width of the room or working place, which usually varies from 24 to 30 ft. in wide places and from 10 to 15 ft. in narrow places. After the place is undercut, it is necessary for the operator to bar the machine back to the track and load it.

The shortwall mining machine, illustrated in Fig. 2, is also self-propelling, and when mounted on its truck moves by its own power from one working place to another. It is equipped with an automatic cable reel, permitting it to run into the working place, taking power through the flexible cable, and when coming out automatically rewinds the electric cable on the reel.

The machine is unloaded from the truck by its own power by means of a power-driven feed rope wound on a drum on the machine. This is accomplished by pulling off the feed rope and hitching it to a jack pipe set along the face. It is not necessary, with this type of machine, to use crowbars to pull it into position, as it is entirely self-handling. The machine is made to pull itself into position and force the cutter-bar under the coal its complete depth, after which the feed rope is hitched to a jack or anchor on the opposite rib near the face, pulling the machine across the face in one continuous operation and undercutting the coal to a depth equal to the length of the cutter-bar, which is ordinarily 6, 7 or 8 ft., and sometimes as high as 12 feet.

Can Cut 12 Places in 8 Hours

After the cut across the face is made, the machine pulls itself from under the coal and loads itself into position on the truck, all by its own power. Machine runners become so skillful in the handling of this type of machine that with very little manual labor they can undercut as high as 10 to 12 places, varying in width from 15 to 24 ft., in a shift of 8 hours.

For mines where the nature of the coal will permit, a more efficient machine than the shortwall machine has been developed which is known as the arcwall machine. This is illustrated in Fig. 3.

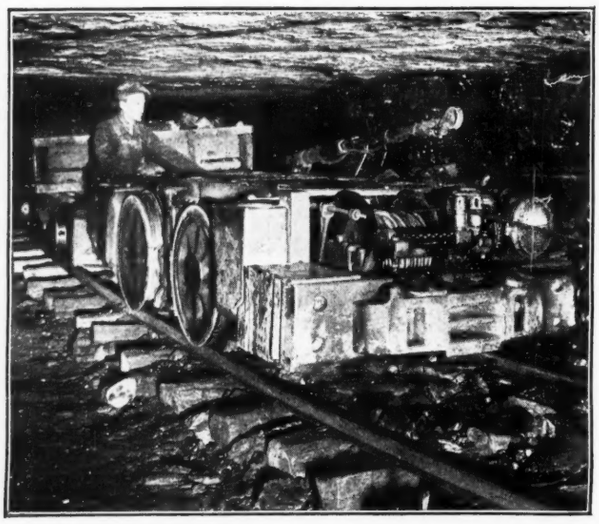


FIG. 4. FIVE-TON GATHERING MOTOR EQUIPPED WITH CABLE REEL

This machine does not unload from the truck, and as a consequence saves considerable time in handling from place to place. It eliminates the labor of handling jack pipes, etc., and does not necessitate shoveling slack to keep it out of the way of the cutter-bar. The cutter-bar swings in a semicircle, and it is possible to cut a place 20 ft. wide and 7 ft. deep in 15 min. from the time the place is entered until it is left.

The machine is arranged to undercut at various heights above the bottom and it has an offset cutter-bar, which permits cutting close to the bottom. Where a dirt band occurs at the top of the seam, the machine has been arranged with high pedestals, as can be noticed in Fig. 3.

It can be seen from this illustration and description that the manufacturers of mining machines have kept pace with the demand of increased output. To do this, it was necessary not only to produce increased numbers of mining machines, but also serviceable ones, rigid in construction and convenient to operate. The development of the electric mine locomotive has kept pace with the mining machine.

The gathering locomotive of the cable-reel type is illustrated in Fig. 4 and the storage-battery gathering locomotive is shown in Fig. 5. These two types of locomotives are used to gather the loaded cars from the working place onto the side tracks on the entry, where haulage locomotives can get them.

The cable-reel locomotive consists essentially of a small haulage locomotive equipped with either a mechanically or electric-driven cable reel on which is wound 350 to 400 ft. of flexible electric conductor. The locomotive can run into the working place away from the trolley wire, taking power from the electric conductor, and when returning wind the electric conductor on the reel in even layers.

The storage-battery locomotive is independent of the range of operation, and the only thing which limits the output of this locomotive is the battery capacity. The average range over which the battery locomotives can operate successfully can generally be stated as 1000 to 1500 ft. haulage with average loads of 15 to 20 tons on grades which obtain under ordinary average mine conditions.

Gathering locomotives of either of the foregoing types range in weight from 4 to 7 tons and small haulage locomotives about the same. The larger haulage locomotives vary from 7 tons up to and including 35 tons. For ordinary length of haul, 10- and 13-ton locomotives are very popular, but where the distance is as much as 2½ miles, it is found economical to use large locomotives, from 25 to 35 tons in weight. In order to make the 25- and 35-ton locomotives easy on the track, they are usually of the six-wheeled type with the weight on the two sets of wheels equalized, as is the standard practice in steam-locomotive design.

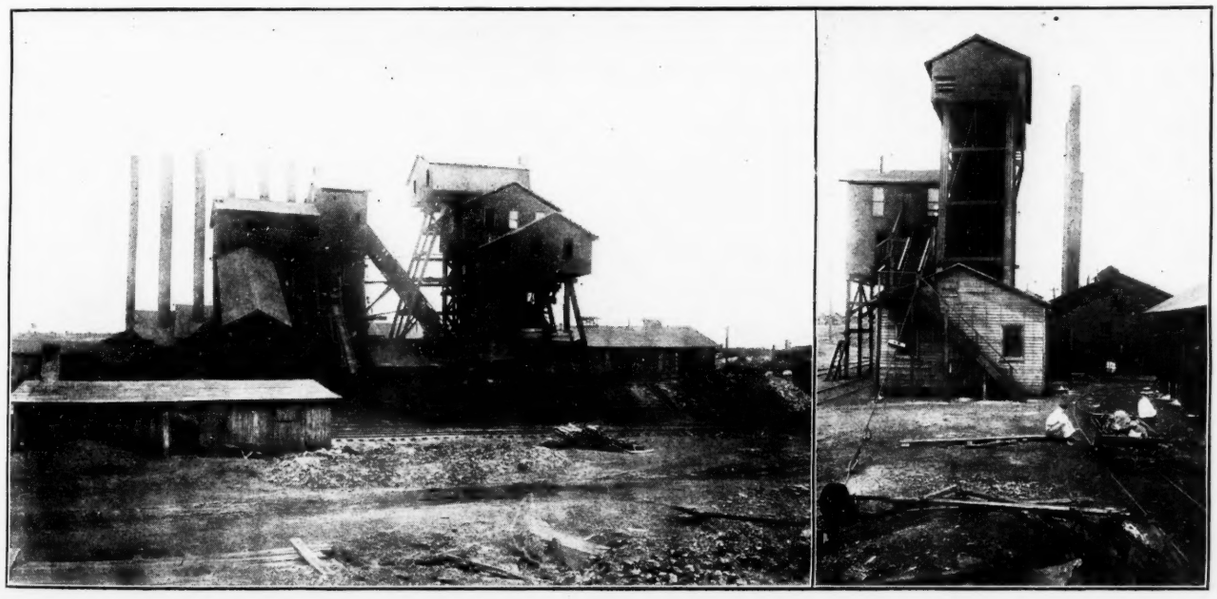
FIG. 5. SIX-TON BATTERY GATHERING MOTOR WITH CAPACITY OF 56 KW.-HR.

Equipment at a 50-Year-Old Mining Operation

SYNOPSIS—*Description of equipment used at 50-year-old operation which has made continued economical working possible. Sand for the mine motors lowered through a borehole. The company gives special attention to first-aid work.*

THE Morrisdale Coal Co. has been operating its mines at Morrisdale, Center County, Penn., for a period of 50 years. The operations cover a tract of 5000 acres, and the company is mining a superior quality of Lower Kittanning grade "B" coal which contains a much smaller proportion of sulphur than is ordinarily found in the coal coming from this seam.

At the present time the tract is being operated from shafts Nos. 1 and 3, and from the Cunard slope. Shaft No. 1 has a daily capacity of 1000 to 1200 tons, No. 3 a capacity of 800 tons and the Cunard slope 1000 tons. Owing to the existing shortage of both labor and cars, these capacities are not now being maintained. The Cunard slope is laid out to give an ultimate capacity of 1500 tons daily, as it is the intention to open up an additional tract from this slope.



TWO SHAFTS OF THE MORRISDALE COAL CO.—NO. 1 ON THE LEFT AND NO. 3 ON THE RIGHT

Although the mines have been in operation for the past 50 years, this company has realized the economy to be gained by keeping its equipment thoroughly efficient and up to date.

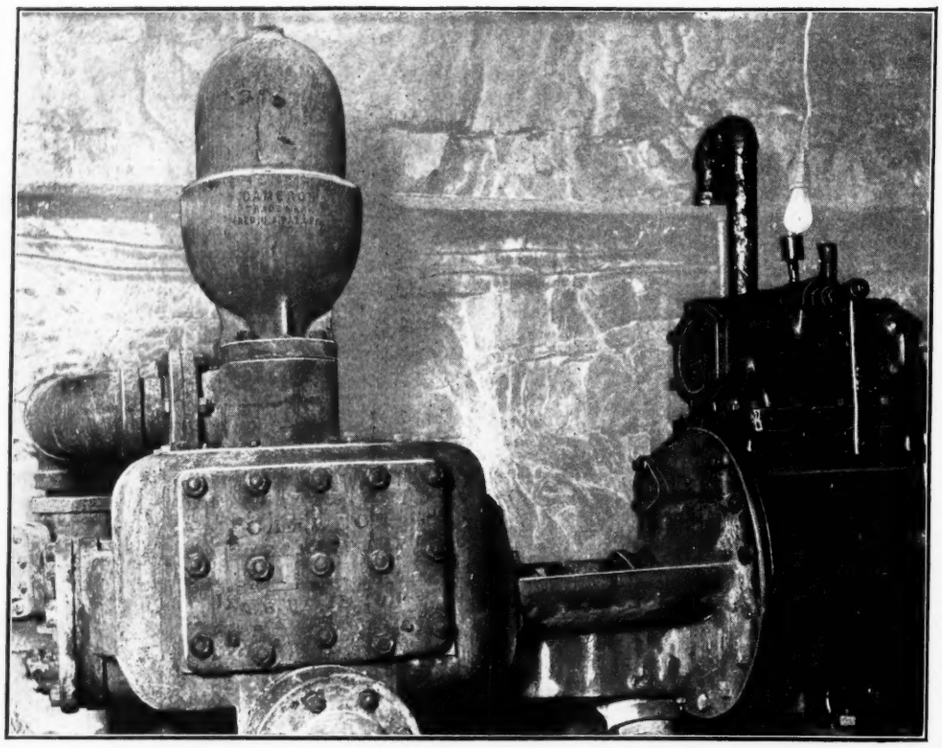
At shaft No. 1 is located a steam-driven Ridgway 200-kw. generator, producing 500-volt direct current. Power is also bought from the Penn Public Service Corporation. This current is 2200-volt alternating and drives motor-generating sets generating 500-volt direct current for the locomotives, fans, hoists and cutting machines, being reduced by a transformer for the lighting circuit to 100 volts.

The ventilating system comprises a main ventilating unit at shaft No. 1 of 150,000 cu.ft. capacity and a booster fan at the slope having a capacity of 40,000 cu.ft. per minute.

At shaft No. 1 there are three 14 x 12 x 20-in. Cameron steam pumps of the piston type, having a total capacity of 1800 gal. per min.; at No. 2 shaft there is another Cameron steam pump of the same size, with a capacity of 600 gal. per min. An interesting mechanical feature of these pumps is the inclosed steam-valve mechanism. The piston near the end of the stroke operates a small pilot valve which, through the action of the steam, causes the main valve to shift, thus reversing the direction of the main piston. Another distinctive feature of these pumps is the easy access to the water chamber. By merely removing the side cover, or bonnet, the valves, guards, seats, stems and springs are all in plain sight. These advantages are much appreciated by experienced engineers and pumpmen. One of the pumps is shown in the accompanying illustrations.

At shaft No. 3 the pumping equipment is electrically driven, consisting of two Cameron centrifugal volute pumps and one Morris centrifugal pump, each having a capacity of 1750 gal. per min. against a 160-ft. head. The Cameron centrifugal pumps, which are shown in the illustrations, are of the double-suction volute type, arranged on a common bedplate with intermediate piping. The pumps are direct-connected to the motor by means of a flexible coupling. The impellers in these pumps are of the inclosed type, while the casing and the bearings are horizontally split, thus giving ready access to any of the internal parts. These pumps are very compact and take up a minimum of room.

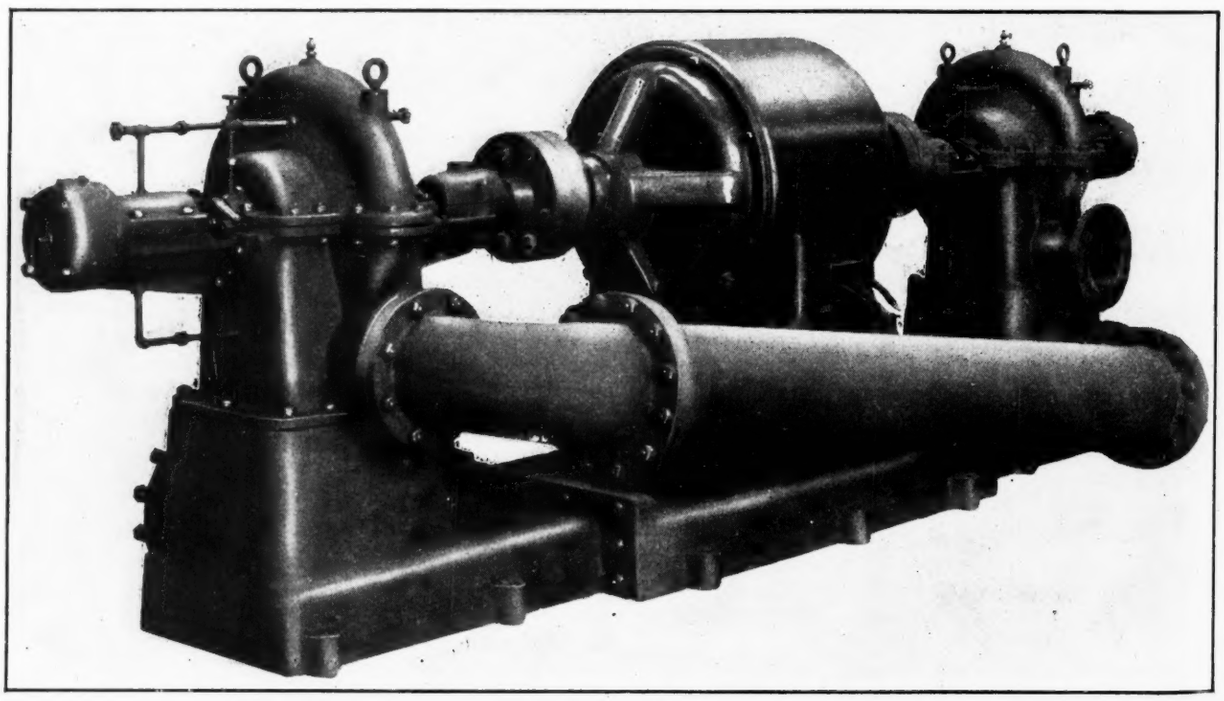
At shaft No. 1 are two 10-ton and two 4½-ton Westinghouse and two 10-ton Goodman electric locomotives; at shaft No. 3 there are two 10-ton and two 4½-ton Westinghouse and one 5-ton Jeffrey locomotives; at the Cunard slope there are one 12-ton and two 5-ton Jeffery locomotives. The cars are all of the round bumper type, manufactured by S. B. Stine. The longest haul



CAMERON STEAM PUMP AT AN UNDERGROUND STATION

in the mines is 1½ miles. At shaft No. 3 there is an inside incline running to a lower vein, operated by a Lidgerwood single fixed-drum 25-hp. electric hoist. This incline is 200 ft. long and has a grade of 20 per cent. The hoist is handling 300 tons daily.

A total of 16 Goodman shortwall cutting machines are used in these mines. A small Lidgerwood electric hoist is used for pulling cars on a slight slope at the heading face. The average lift at the shafts is 175 ft. from the level to the dumping point of the tipple. At shaft No. 1 there is a Monongahela steam hoist of 160 hp., having a drum 7 ft. in diameter and 4-ft. face. Shaft No. 3 has a Lidgerwood electric hoist, with a single fixed drum 72 in. in diameter and 24-in. face, grooved to coil 180 ft. of 1⅛-in. wire rope, and fitted with a powerful 83-in. diameter post brake, a Welch safety controller to prevent overwinding or overspeeding and operated by a 200-hp. Westinghouse motor. This hoist has an unbalanced pull of 3760 lb. at 900 ft. per minute. The Cunard slope is 650 ft. long and has a 25 per cent. grade. It is operated by dilly cars using an endless rope. The haulage rope is 1⅛ in. in diameter and the tail rope ¾ in. in diameter. During the sinking of this slope a 25-hp. single fixed-drum Lidgerwood electric hoist was used. The incline is now operated by a Lidgerwood tail rope electric hoist, having a fixed drum of 60-in. diameter and 67-in. face overall, divided by a central flange and fitted with a powerful post brake. The hoist is operated by a General Electric Co. 165-hp. motor. It is handling ten-car trips at a speed of 400 ft. per minute.



A NEW TYPE OF CAMERON CENTRIFUGAL PUMP IN USE AT THE MORRISDALE CO.'S MINE

The company has a well-equipped electrical repair shop and does all its own repairing and winding. Each mine has a concrete motor pit fitted with a 15-ton overhead crane, which is capable of easily lifting any of the motors for replacing wheels, or making any necessary repairs.

A very efficient method is in use for providing sand for the locomotives. A sand dryer is located at No. 1 shaft. The sand runs from the dryer into a bin, which is located over a borehole, through which it is conducted down into the mine, supplying the motors for the entire workings.

At each mine there are two fireproof first-aid-stations, or inside hospitals, constructed of concrete and equipped with Johnson first-aid stretchers and outfits and manned by two crews. Every sixth man carries an individual first-aid package, and one is carried also on every locomotive and every mining machine. The mine foremen are all connected with the first-aid work and take great interest in it. Dr. M. C. Dinger is the company physician.

That the first-aid equipment is on a par with the operating equipment is proved by the fact that one injured man was given first-aid treatment and removed from the mine to the Cottage State Miners' Hospital, 3 miles away, in 20 minutes.

Model Coal-Crushing Plant

By RICHARD G. MILLER
Chicago, Ill.

SYNOPSIS—*Coal of all grades, received in all kinds of railroad cars, is dumped, screened, picked, crushed, reloaded and dispatched to the various near-by stoker plants. A careful selection and arrangement of machinery has resulted in high efficiency at low cost.*

PROGRESSIVE operators of coal-handling plants and machinery allied to the industry constantly strive to increase production at decreased costs. Especially, in these times of great expansion and development, are they keen to the many benefits of and necessities for methods that tend to decrease labor and maintenance charges.

The desired results can often easily be accomplished by the selection of the proper equipment to perform the particular work at hand, whether this be in mining, handling or the preparation of the product for market or the use to which it may be put.

Plant efficiency must be increased; maintenance reduced and labor costs decreased, so that the progressive engineer, manager or executive must select with care his men and means for arriving at these ends.

An excellent example of the foregoing is a model installation embodying a combination of simple and efficient units in a coal-crushing plant at the manufacturing works of the Standard Oil Co. at Whiting, Ind. The problem here involved included the receiving and dumping of any size or quality of coal from any kind of railroad car; then successively picking, crushing, elevating and reloading as a stoker product for distribution to the various stoker installations at the works.

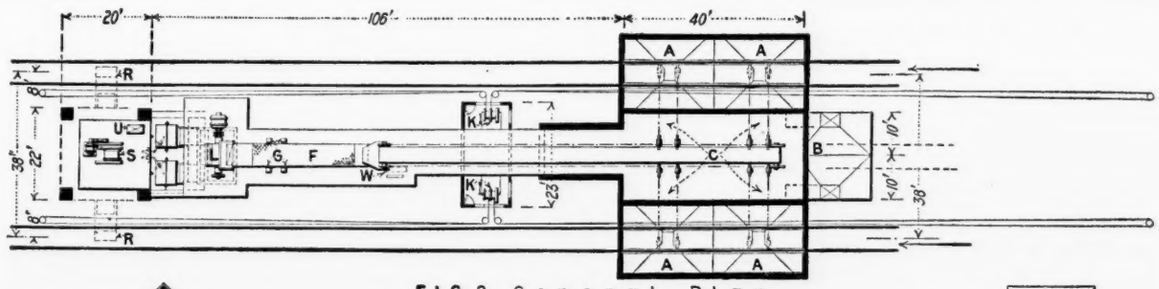


FIG. 2 General Plan

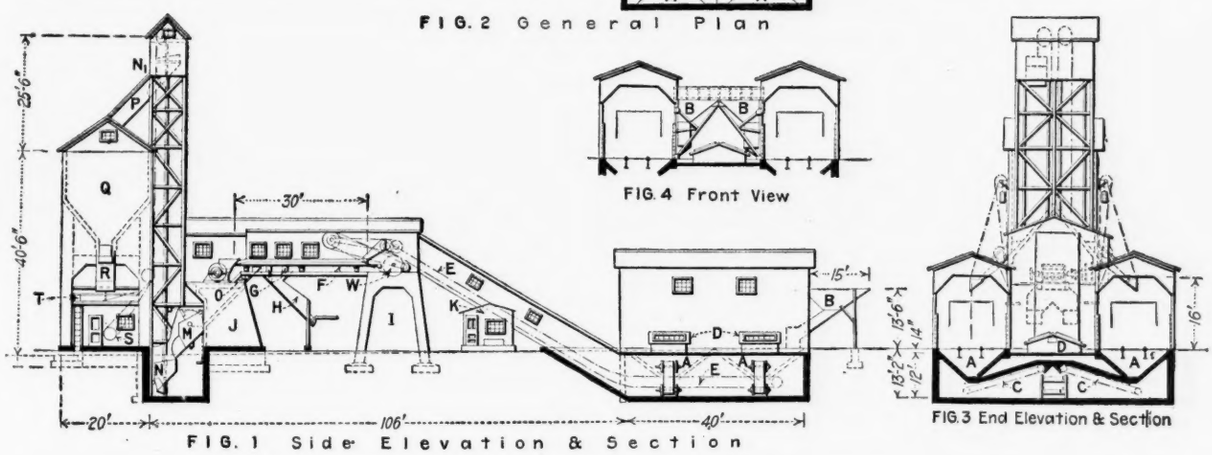


FIG. 1 Side Elevation & Section

FIG. 4 Front View

FIG. 3 End Elevation & Section

FIGS. 1 TO 3. CONSTRUCTION DETAILS OF A MODERN COAL-CRUSHING PLANT

The extreme simplicity of this plant, the general method of operation and the successive steps in the handling of the coal will be apparent from the accompanying illustrations. The plant is electrically operated throughout by 440-volt alternating current, and all but the screen drives are connected by means of steel gears, or flexible couplings, well protected with guards, while hand railings are employed in all cases, whether guards are installed or not.

Provision is made for unloading hopper-bottom or side-dump cars into the two 40-ft. receiving hoppers *A*, Figs. 1, 2 and 3, and flat-bottom cars by locomotive crane into the steel hopper *B*. This arrangement permits of easily prosecuting the unloading operation at the rate of 3000 tons per day of two shifts. The car-pullers *K* spot the loaded cars and also move the empties to the coaling aprons *R*, where the crushed coal is reloaded from the concrete pocket *Q*. All the conveying machinery is rugged in design and capable of easily handling the required capacity.

The Marcus horizontal picking-table screen *F* is for the purpose of removing ¾-in. slack and picking out natural impurities as well as iron and other things which get into the coal while in transit. These impurities are thrown into the chutes *G* and accumulate in the pocket *H*, whence they are removed by cart. The slack chute *O* receives the ¾-in. slack from the bottom deck of the Marcus screen *F* and delivers it beyond the crusher *L* into the concrete hopper *J*. Coal that is larger than ¾ in. is delivered to the crusher from the screen and is finally deposited as ¾-in. crushed coal in the hopper *J*.

The automatic feeders *M* alternately charge the elevating buckets *N*, which deliver the entire crushed product through the chute *P* into the pocket *Q*, for loading out into railroad cars for distribution about the plant.

The novel features of this plant are the Marcus horizontal picking-table screen and the automatic elevating equipment. The Marcus is well known to mining men and needs no further comment. It is actuated by a massive drive head *W* carried on a rigid concrete pier which also supports the steel housing, as illustrated. The elevating equipment is balanced and operated by the automatic reversible electric hoist *S*.

The extreme simplicity of this equipment reduces labor, power and maintenance to a minimum. Moreover, the combination and application of the particular devices are ideal for accomplishing the preparation of the coal for modern stoker purposes, and permit using structures most economical in first cost and also those offering unusual accessibility and protection to the operating labor.

The elements combined in this coal-crushing plant make it of interest to engineers and executives engaged in modern business enterprises. So many good features are seldom easily obtained, because complicated conditions are generally difficult to overcome. This plant was designed and built by the Roberts & Schaefer Co., engineers and contractors, of Chicago, Illinois.

New Thin-Seam Mounting for Jackhamers

By H. L. HICKS

SYNOPSIS—*A description of a new mounting for this type of drill. Also a good method for placing holes in mining thin seams of anthracite and some of the practical results obtained.*

IN THE search for ways to increase production with a lessened working force there has been developed in the Scranton district a new system of mining the thin seams of anthracite common to that field. Undercutting these thin seams by machine has been a slow and relatively costly process and in many instances an impossibility, owing to bad bottom filled with sulphur balls. Hand-mining has nothing to recommend it and is excessively costly.

The new method is entirely one of boring and blasting, based on the use of compressed-air-operated Jackhamers and cruciform coal augers, with a special type of mounting, as shown in Fig. 1. While it is possible to work with Jackhamers without the mounting, its use is of decided advantage in reducing the fatigue caused by working in cramped positions, unavoidable in mining narrow seams.

The Jackhamer is the self-rotating hammer drill which is too well known in the coal-mining industry to need further description. The mounting which makes this new system practicable for narrow seams is simplicity itself—a frame carried on four legs, the principal feature of which is two rails on which the Jackhamer slides, the latter being held in a suitable carriage. Two hinged clamps with swing bolts quickly secure any standard Jackhamer or permit its convenient removal from the carriage, which in turn merely rests on the slide rails. The mounting, which is styled by the manufacturer Type JC-40, weighs 68 lb., the Jackhamer 43 lb. and the carriage, as stated, 20 lb. The

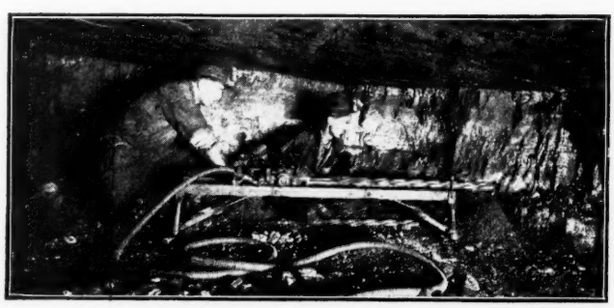


FIG. 1. FRAME LEVEL FOR DRILLING HORIZONTAL HOLE

working crew of drill runner and helper can easily pick up the entire outfit and shift it about as desired.

The distance from floor to center of drill when mounted is 12 in. Extension points, 12 in. long, give additional height where needed and permit the setting up for either flat or angle holes, as shown in Fig. 2. Hinged clamps at the forward end of the frame guide the auger steel and are of particular value in starting a hole.

FIG. 2. FRAME TILTED FOR ANGLE HOLE

A set of two steels 3 and 6 ft. in length is the usual practice, although 4- and 8-ft. steels are needed in special instances. Fig. 3 shows the standard steel, a twisted cruciform of 1⅞-in. diameter fitted with standard ⅞-in. hexagon Jackhamer shank and collar. Crossbits are used, with a gage variation of ⅛ in. between changes. Holes are usually bottomed at 2¼ in. Special dies for the Leyner sharpener insure gage exactness in bitting and resharpening this special auger steel.

In operating this equipment it is customary for both men to feed the drill forward on the mounting. It is

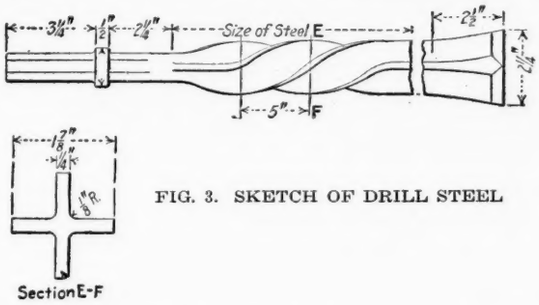


FIG. 3. SKETCH OF DRILL STEEL

noted that the positive rotation cleans the hole perfectly and in combination with the hammer action gives a high drilling speed. Little dust is made.

The following examples outline the possibilities of this method of anthracite mining and are representative of the usual practice. For this detail information the writer is indebted to William Wilhelm, of Scranton, Pennsylvania.

Fig. 4 represents a system of drilling a chamber 30 ft. wide where the coal is made up as follows: Top bony 2 in. thick, top coal 6 in. thick, sulphur and bony 4 in. thick and bottom coal 36 in. thick. The chamber

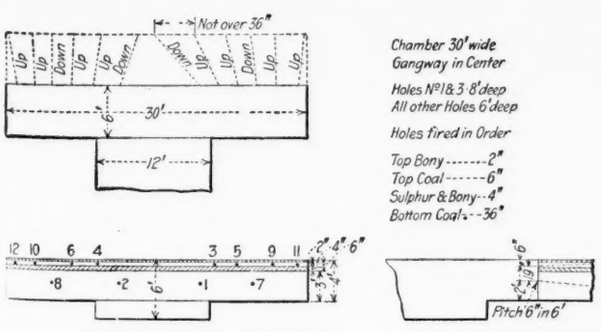


FIG. 4 LOCATION OF HOLES WITH GANGWAY IN CENTER WHEN TWO 8-FT. HOLES ARE USED

is drilled with 12 holes. Eight are drilled in the top measure and four in the bottom. As will be noticed, the top holes are drilled on an incline toward the bottom, as shown. Hole No. 1 is 8 ft. deep, hole No. 7 is 7 ft. deep and all others 6 ft. All holes bottom at 2¼ in. and are loaded with black powder as follows: No. 1 with 34 in., No. 2 with 18 to 20 in. and all others with 22 in. Great care is taken in tamping these holes; the tamping, with the exception of the opening hole, should always equal at least twice the amount of powder in each hole.

For igniting and blasting it is found advisable to use an electric squib in the center of the charge rather than a miner's squib or safety fuse. When igniting the near end of a charge of blasting powder in a long borehole it is quite likely that a portion of the coal or rock will move out before the entire charge explodes and relieve the confinement of the powder in the far end of the hole where the burden is usually the heaviest and the greatest explosive force needed. The use of the electric squib requires 6 in. less powder than is possible with miner's squibs, and is safer and more economical in that it permits the firing of four holes at a time if desired.

Holes are fired in rapid succession as follows: First No. 1, then No. 2, then Nos. 3 and 4, then Nos. 5 and 6 and the remaining holes in pairs. This layout requires

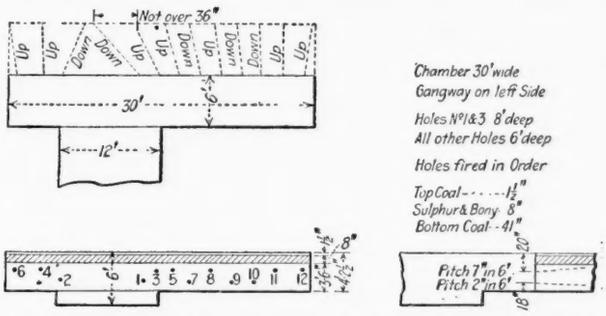


FIG. 5. METHOD OF LOCATING HOLES WITH GANGWAY ON SIDE OF CHAMBER

1¼ kegs of powder and will bring down approximately 26 tons of coal when the coal lays as shown.

The total drilling time for this 30-ft. chamber is from 45 to 50 min. for a drill runner and helper using a Jackhamer in the special mounting, giving a drilling speed of 1½ ft. per min. of the total time. With air pressure from 80 to 90 lb. the two men can easily drill six chambers in a working day of 8 hours.

Fig. 5 is also a 30-ft. chamber. In this case the top coal is 1½ in. thick, a band of sulphur and bony 8 in. thick and bottom coal 31 in. thick. Twelve holes are required, drilled as shown. In this case the top hole pitches 7 in. in 6 ft.; the bottom hole pitches down 4 in. in 6 ft. Hole No. 1 is 8 ft. deep, No. 3 is 7 ft. and the others 6 ft. deep. These holes are loaded with black powder substantially as in the preceding layout. The order of firing is: Nos. 1 and 2, which make the opening cut, then 3 and 4, then 5 and 6 and then 7, 8, 9 and 10, and last 11 and 12.

It will be noticed that the gangway in this case is at the left. The object of this system, which is extensively used by the Delaware & Hudson Co., is to leave plenty of room on the side to gob the bottom rock and also

leave an air opening from chamber to chamber for ventilation.

Fig. 6 shows a 30-ft. chamber in which the formation is: Top coal 12 in., sulphur and bony 6 in., bottom coal 15 in. and bottom rock and bad coal 5 in. All holes are drilled 6 ft. deep. No. 1 is loaded with 24 in. and all others with from 18 to 22 in. of powder. These are fired as follows: First No. 1, then No. 2, next Nos. 3 and 4, and the remaining holes in pairs. In many cases the three holes shown drilled above the band of bony and slate are found unnecessary and are not used.

One of the marked savings with the Jackhamer method of mining is a reduction in the cost of loading the coal. By shooting, the coal is brought down in

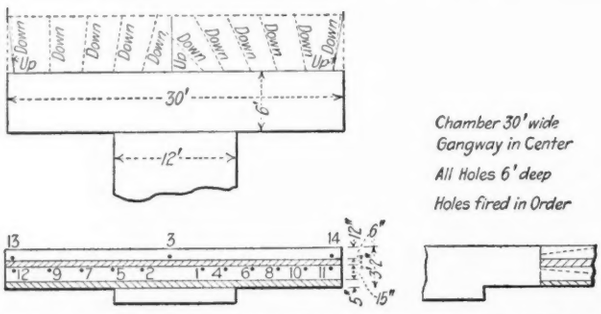


FIG. 6. METHOD OF LOCATING HOLES WITH GANGWAY IN CENTER OF CHAMBER

desirable sizes and it is estimated that five cars can be loaded in the time required to load three cars where the coal is undercut and dropped down. In this connection the following figures are of interest, being a test conducted by one of the Scranton companies of five cars of undercut coal and five cars of Jackhamer-cut coal. Each lot was put through the shaker separately and the weights recorded.

UNDERCUT COAL

Car No.	Lump	Grate	Egg	Stove	Chestnut	Small
1	1,560	1,395	585	460	445	808
2	1,707	705	740	300	538	670
3	656	1,005	917	505	840	1,805
4	2,123	1,650	936	420	607	1,162
5	2,457	1,559	210	165	488	862
Total	8,503	6,314	3,388	1,850	2,918	5,307

JACKHAMER-CUT COAL

6	1,592	485	614	449	985	2,584
7	1,082	1,030	305	482	960	2,035
8	950	921	310	475	1,078	2,059
9	973	1,115	588	598	510	1,702
10	727	903	875	170	526	1,221
Total	5,324	4,454	2,692	2,174	4,059	9,601

A marked reduction in the proportion of lump and an increase in the domestic sizes will be noted.

The Jackhamer and coal auger is found to be practical in every case regardless of top roof or bottom rock and is claimed to bring down all the coal in convenient sizes. It is said to eliminate the plugging and barring out necessary with undercutting. The marked advantages of the equipment are its lightness and portability and the low upkeep. It is estimated that an outfit with two men will take the place of from eight to ten miners drilling by hand or will do three times the work accomplished by an equal number of men with other methods of undercutting and machine mining. This latter estimate is based on average observed performances of six chambers for the Jackhamer and two chambers for an undercutter in a working day of 8 hours.

In considering the installation cost of this equipment, account must be taken of the fact that many mines have been using unmounted Jackhamers instead of hand augers for their shothole work and that in these cases the proposition is but one of adapting existing equipment, with a possible slight increase in the number of machines. Where the purchase of new equipment is contemplated it is apparent the initial outlay for a Jackhamer outfit is very small compared with that of other types of machinery of equal producing capacity. Many mines have air available and many more are using portable mine-car compressors. Electrically equipped mines often find the latter form of air power more economical and convenient than permanent air piping from a central compressor.

While the system calls for approximately $1.20 worth of explosives per 30-ft. chamber in excess of the amount which would be used if the coal were undercut, this is more than offset by the increase in speed, saving in maintenance and repairs, and lessened overhead expense.

The Jackhamers in use are extensively employed for rockwork and rather than being an inconvenience, the

FIG. 7. DRILLING ROOF BY MEANS OF EXTENSION FRAME

new type of mounting shown in Fig. 7 is of advantage for this work. Long points or legs can be readily provided and a steel guiding clamp of proper size added at the opposite end of the mounting. By reversing the mounting, roof rock or slate can then be drilled as conveniently as coal.

The manufacturers of this machine state that at a socalled "Jackhamer contest" on July 4 at Tonopah, Nev., in which there were 42 contestants, including among them representatives of all the manufacturers of self-rotating hand-hammer drills, the Jackhamer (Type BCR-430) won first, third and fourth places, while the Sullivan Rotator (Type DP-33) won second place.

The word Jackhamer was apparently improperly used on this occasion to designate the entire class of self-rotating drills, as it is a copyrighted trade name and the sole property of the Ingersoll-Rand Company.

New Method in Screening, Picking and Loading Bituminous Coal

SYNOPSIS — *By arranging shaking screens in duplicate so that one-half of each unit travels in the opposite direction to the other half, the reactions are balanced and the strain on the tipple diminished. By removing the lumps at an early stage in the screening, the breakage of all sizes of coal is reduced, rescreening is made unnecessary and primary screening is made effective. The tipple also is brought to manageable dimensions.*

THE preparation of bituminous coal has, during the last few years, received much intelligent attention and study from engineers. The coal tipple has been improved in design and equipment and its arrangement has been made flexible so that it can meet the changing conditions of mining and the varying demands of the market.

The inclined shaker screen and the apron picking table, used in conjunction with it, have in a great many new installations been superseded by horizontal equipment that serves both for screening and picking. This equipment has many advantages, such as lower dumping point, a reduction in the number of units required in the preparation of the coal and simplified tipple construction. But there are a number of disadvantages.

Engineers in the United States and foreign countries have for years sought to convey and screen coal on horizontally reciprocating troughs, but nowhere with entire success. The aim is to avoid costly and cumbersome mechanisms or drive heads requiring massive foundations or supporting structures, because these provisions increase the cost of installation and maintenance, and are further objectionable because of their position near the shaft. Moreover, the practice of carrying the larger sizes of coal almost the full length of the screening surface is objectionable. The lump coal in particular traverses the entire length of the screen. In the passage of this coarse coal the smaller material is crushed under the rolling or screening action of the larger. Furthermore, the presence of the larger coal makes effective picking difficult, and the screening surface has a reduced effectiveness because the larger sizes interfere with the screening action.

The demand for a carefully cleaned and graded product is not just now so pressing as in the past, but the companies that are building tipples are preparing for the time when only those which are well equipped will be able to meet the fierce competition.

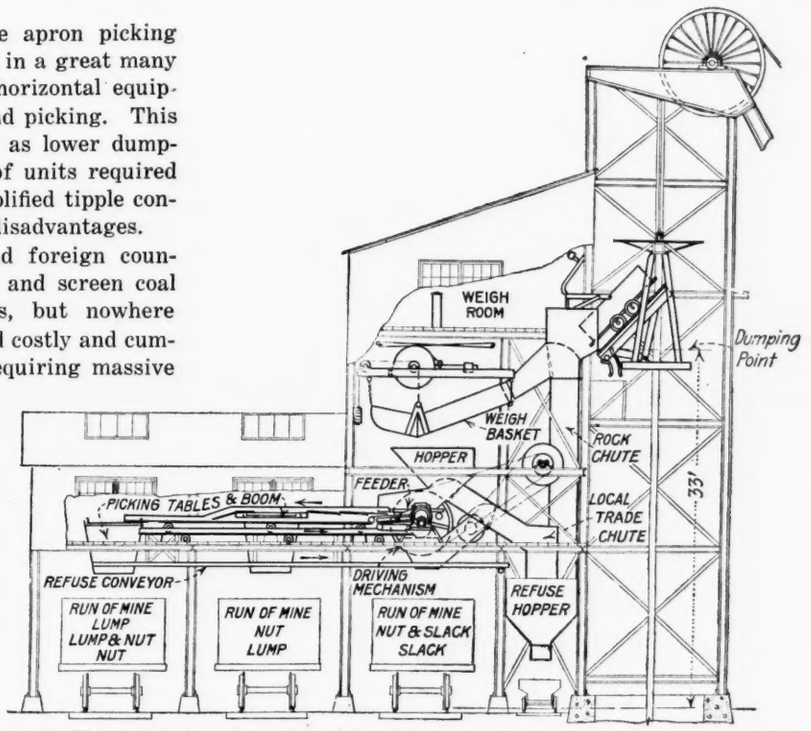
With these ideas in view, the tipple illustrated herewith has been designed by Jacobsen & Schraeder, Inc., engineers, Marquette Building, Chicago. Patents have been applied for in the United States and abroad.

A side elevation of the tipple is shown below. Here the coal is hoisted in the regular way on the self-dumping cage and dumped into the chute which delivers the coal directly to a weigh basket with a minimum of breakage. After the coal is weighed it is dumped in the feeder hopper, from which it is fed at a uniform rate onto the shaker screens.

These consist of one upper and one lower screen operating in opposite directions, both being of substantially equal weight. Consequently the reaction of one is entirely absorbed by the reaction of the other. Thus the need for heavy foundations is eliminated and the vibrations in the structure are reduced to a minimum.

The operating mechanism for imparting the reciprocatory motion to the screens consists of one continuous straight shaft on which are oppositely mounted two pairs of ordinary eccentrics, each pair operating one section of the screen. A uniformly rotating power-driven differential flywheel pulley imparts to the shaft a motion which is slow at first and then gradually accelerates toward the end of the stroke, then quickly reverses and slows up toward the end of the return stroke. This insures a continuous travel of the coal at a speed suitable for screening and picking. The eccentric which operates the reciprocating feeder is also mounted on this same shaft and thus imparts to the feeder plate the same irregular reciprocating motion which gives that part a suitable self-cleaning action.

Thus the installation of an independent feeder shaft with its bearings, supports and drive pulley is saved. The arrangement has the advantages enjoyed both by



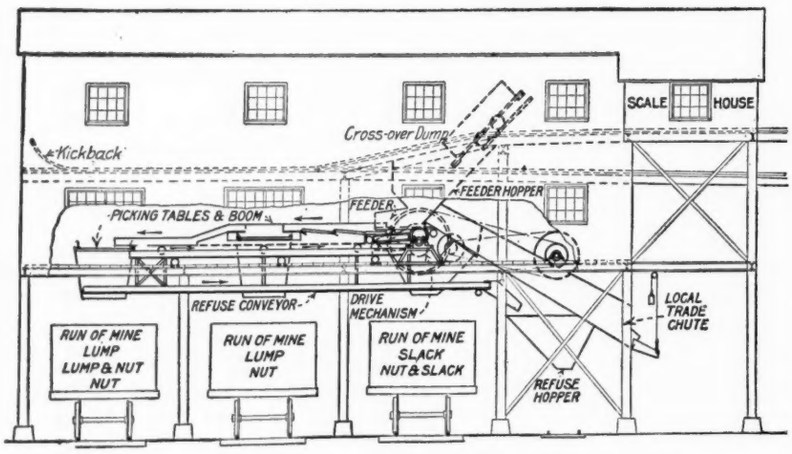
ILLUSTRATES SYSTEM BY WHICH THE TIPPLE IS FREED FROM JOLTING AND THE TIPPLE REDUCED IN LENGTH

the apron type and by the old-style reciprocating feeder, and it has none of their inherent disadvantages.

The coal, which is delivered from the feeder onto the dead plate on the upper horizontal shaker screen, passes directly over a bar screen which is made in two sections, each about 4 ft. long with a step of 4 in. at the end of the first section to turn the coal as it passes over that point. The openings between the bars may be spaced from 3 in. to 6 in., as required.

The lump coal that has passed over these bars is entirely free from the mixed nut and slack, which have dropped through the bar openings. It is gently conveyed onto the horizontal cross picking table and loading boom, where it is picked and then gently lowered into the car without breakage.

This picking table and boom is operated with a similar mechanism to that driving the shaker screens, but is of lighter construction. The nut and slack which fall through the bar screen drop onto the lower deck of the upper screen. For removing the slack from the nut this lower deck is provided with from 14 to 20 ft. of slack perforations, preferably of the lip-screen type. The slack falls upon the lower section of the screen, which is provided with blank plates. This conveys the coal back to the slack track which is located directly below the driving mechanism of the screens.



A JACOBSEN TIPPLE ADAPTED TO THE CROSSOVER DUMP

The nut coal which passes over the slack perforations is conveyed forward and delivered onto a picking table and loading boom identical to that described for the lump. A removable plate is provided over the lump boom so as to allow the passage of the lump onto the lower deck for mixing with the nut.

It will be observed that by this arrangement almost any combination of mixtures can be made. Furthermore, the larger sizes are saved from breakage by not having to pass over the smaller perforations. Thus, for instance, the lump does not pass over the perforations for screening out the slack. Moreover, when four sizes are made the egg coal is saved from much breakage. The picking table may also be provided with perforations and with a second deck, so as to screen out the slack when run-of-mine is picked and loaded. In this case the bar screen will be covered with blank plates.

It will furthermore be noted, that by this system of screening the efficiency of the screens is greatly increased, as the capacity of any screen is based upon the effective screening area for the slack coal. In this system the screening area is relieved of the lump and egg sizes which otherwise would largely cover the perforations. Hence, the capacity of the screen is thereby increased, although its length is materially decreased. The old method of screening away the small sizes first necessitated a screen from 16 to 20 ft. longer than is needed with this system. The long screen made it essential to erect a building and supporting structure of corresponding length, and yet the effective screening area was materially lowered.

With this system rescreening is entirely unnecessary, as the larger sizes after screening pass over smooth surfaces with practically no drop where breakage can occur. The pickings are thrown into a refuse conveyor, which is a narrow trough rigidly fastened to and made a part of the lower screen, from which it receives the same conveying motion. Thus the refuse is conveyed back to the refuse chute, which is located in direct line with the rock chute that receives the rock from the mine. The feeder hopper is provided with a flap gate for discharging weighed run-of-mine into the local-trade chute. This chute also has a gate for passing the run-of-mine direct to the slack track without operation of the shaker-screen equipment. Some of the advantages obtained from this tipple design and system are briefly as follows: A low dumping point; a tipple structure 16 to 20 ft. shorter, occupying less ground space; smaller foundations, a self-cleaning reciprocating feeder; an efficient shaker screen; a higher yield of all larger sizes; elimination of rescreening equipment; greater facilities for loading and mixing the various sizes; a desirable and satisfactory refuse and rock disposal. Summarized, these advantages give a better product at a minimum cost.

Cotton Rope for Transmission

In England cotton has entirely supplanted all other material in the manufacture of transmission ropes, said J. Melville Anderson in an address before the Engineers' Society of Western Pennsylvania recently. Manila rope, he said, is of the dim and distant past. Even manila—and steel-rope manufacturers employ cotton ropes for transmitting their power. Some cotton ropes that were installed September, 1878—nearly 39 years ago—and have been operating on 24-hour service are still in regular use. In this installation 24 ropes of $1\frac{3}{4}$-in. diameter transmitted 820 hp. at a velocity of 4396 ft. per min. direct from the flywheel of an engine measuring 28 ft. in diameter. It is common to find ropes doing night-and-day service for a period of 20 years and over.

In comparing cotton and manila ropes for transmission service one must not lay too much stress upon initial cost, for although cotton is dearer than manila its superior resilience, grip and "groove impact" add so greatly to its driving qualities that more horsepower—sometimes one-third more—may be transmitted.

As cotton rope lasts three times as long as the manila product abundant compensation for the greater first cost is generally secured long before the rope is finally worn out and has to be cast into the discard.

Manila rope has the greater tensile strength but it is so harsh and wiry in character that the strands do not take kindly to the successive twisting and bending operations, nor do they cling to the sheaves with the tenacity of the softer material. Having little resilience the strands scrub each other, setting up internal abrasion which not only injures the rope but also results in repeated tightenings.

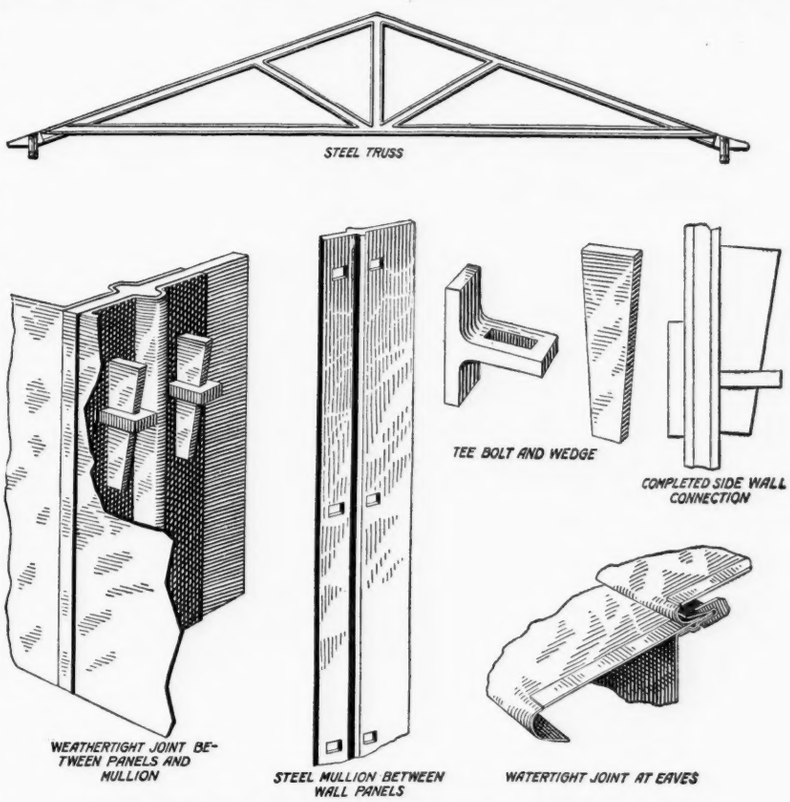
Steel for Building Construction

SYNOPSIS—*Description of a method of building all-steel sheds and shops of sections of pressed steel heavily flanged on both edges. These sections are butted against tongued steel mullions and held in place by wedges. Trusses, electrically welded into one piece, support the roof, which is covered by steel roofing plates with curved edges that are nipped into place by small clamps.*

STEEL is found in most unlikely places today. The old conception of the way to construct things was based on the limitations of timber. For the most part, we made plane surfaces and nailed or dovetailed them together. When we came to use steel, we took a somewhat similar plan. We made flat plates and tried to get them bolted or nailed snugly to steel or wood respectively. Somehow we missed the fact that steel could be bent in a mold to any shape we pleased. As a result of experience, we are likely to find even the farm wagon and the buggy following the automobile into the all-steel class; and furniture, window casings, office fixtures and the like have already shown how adaptable steel is to uses which hitherto wood monopolized. The steel building will make its way with other steel construction. It is possible now to erect a steel building without any bolts. Such a building can be dismantled. The writer had almost said "torn down," but that doesn't represent the condition at all—in a few hours every part of it can be piled up unbroken and unspoiled for use in another place. What is more, it can be built of greater length, or of less length, in the new location by adding or omitting panel pieces, mullions, roof trusses and roofing plates. The sides of the building are built up of panels of No. 18 gage steel. They measure 4 ft. by 7 ft. 10 in., the larger dimension being the height. These panels are deeply flanged along the vertical, or 7-ft. 10-in. edges, and into the flange thus made a groove is rolled, as shown in the illustration. The flanges of adjacent panels are separated by a small steel piece or mullion. This mullion is rolled with a projecting tongue, or bead, on both sides, this bead fitting into the grooves of the adjacent panels. The flanges of the panels and the mullions are slotted on each side of the groove near the top, at the middle and near the base. Special T-bolts are driven snugly through these slots. The bolts are themselves slotted and so can be secured by the driving of wedges through the projecting tongues. The corner panels are the same size as those for the sides and ends of the building, but the angle is made in the panel, half of the panel serving as part of the side of the building and half as part of the end.

The method of fastening is stiff, sure and simple—by grooved flanges, tongued mullions, slotted T-bolts and wedges. Steel thus secured does not let in the weather like steel plates fastened to angles. The joint is weather proof. It is clear on the face of it that a building made of such units can be pulled down and reerected with no loss of material and little loss of time, for everything depends on the wedges which, unlike bolts, are easily placed and as readily removed. Where a bolt would probably necessitate the use of a chisel for removal, a sharp rap from a hammer will loosen the wedge without injury to anything.

Special panels are supplied where sashes are required. The sashes are hinged at the top and may be opened

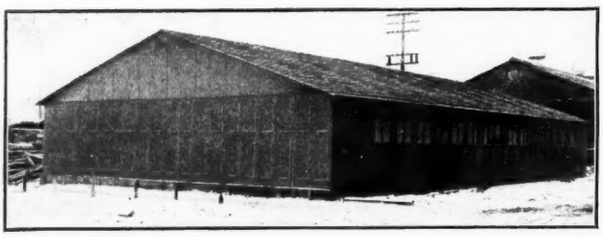

STEEL TRUSS
WEATHERTIGHT JOINT BETWEEN PANELS AND MULLION
STEEL MULLION BETWEEN WALL PANELS
TEE BOLT AND WEDGE
COMPLETED SIDE WALL CONNECTION
WATERTIGHT JOINT AT EAVES

ILLUSTRATING HOW THE VARIOUS PARTS ARE ASSEMBLED

to any desired angle, being held in place by a push-bar lock. Doors are made either solid panels or equipped with glazed openings. They may occupy one or two panels, and the opening will measure 4 or 8 ft. in width and 7 ft. 5 in. or 7 ft. 9½ in. in height. But the latter height is not always satisfactory, so a special door 9 ft. 9½ in. high is supplied if necessary.

The roof is supported by electrically welded steel trusses which themselves rest on the mullions of the side walls. These mullions are cut 10 in. shorter than the standard, and by that means the "gussets" of the steel trusses can pass down between the panels.

There is a bead on both sides of the gusset like that on the mullion, and it is slotted in the same way. So when the roof truss is in place the T-bolt can be slipped through the panels and the gusset and wedged securely into place. The weight of the truss, therefore, falls on

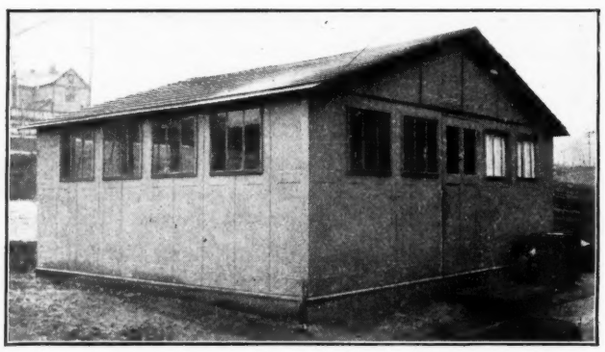


A TRIUMPH OF STANDARDIZATION IN STEELWORK
Being built of molded steel, building is fireproof and can be dismantled readily without loss

the mullion and panel both. It is a clever piece of construction and knits the building solidly together.

The steel truss may be of 6-, 8-, 10- or 12-ft. span. In that case it is a simple truss of the "kingpost" variety. But care must be taken to remember that it has no bolts or rivets. It is one piece and therefore strong, rigid and less likely to rust.

Where steel trusses are of greater span, they are made with struts joining the base of the kingpost with the center points of the rafters. These trusses are of



STEEL HOSPITAL BUILDING AT YOUNGSTOWN, OHIO

18-, 20-, 24- and 28-ft. span. They also are electrically welded one-piece structures, sturdy though light.

The illustrations clearly show the ingenious way in which the roofing plates are secured without bolts or rivets. The joints are covered by weather-tight strips driven into place through the medium of a piece of wood with a properly grooved head.

The advantage of this steel building is, of course, not only in its portability but in its fireproofness. It is also tighter than a wooden building of cheap construction. The doors, not being of wood, do not warp and get out of line. They fit regardless of the weather.

There are many buildings erected around a mine which serve only a temporary purpose. The right size of a building or the right location may be in doubt. The steel-construction building meets that uncertainty. It can always be lengthened or removed. It may shelter a pump today or be used at a sawmill tomorrow. It can be erected as a blacksmith's shop at a mine or as a general utility shed where a new opening is being made. If you don't want it, you can sell it or pile it away under cover. The Truscon steel buildings, as they are known, are always an asset, which cannot be said of many buildings at plants no longer in operation. The Truscon buildings are manufactured by the Trussed Concrete Steel Co., of Youngstown, Ohio. Perhaps it is well to repeat here that despite the name of the company that manufactures the product there is no concrete in the construction unless you like to use it in the foundations.

Maximum Prices in the Middle West

The Illinois Coal Operators' Association, the Coal Operators' Association (5th and 9th Districts) and the Central Illinois Coal Operators' Association, under date of July 2, 1917, sent the following communication to the Illinois coal operators:

Secretary Lane, Governor J. F. Fort, of the Federal Trade Commission, and the Coal Production Committee of the National Defense Council, in a conference held at Washington, D. C., June 26 to 28 inclusive, having heard the statements of the coal operators of the country regarding production costs and the conditions now surrounding that industry, recommended the following maximum prices for Illinois, to which the special committee of seven Illinois operators assented:

Mine-run, 2-, 1½-, 1¼- and ¾-in. screenings, Nos. 4 and 5, $2.75; domestic sizes, $3.50, including lump (1¼- to 6-in.), furnace (6- x 3-in.), small egg (3- x 2-in.), stove (2- x 1¼-in) and domestic chestnut (1¼- x ¾-in.), or any combination of these sizes greater than coal passing through a 1¼-in. round perforation. All prices are per net ton of 2000 lb. f.o.b. mines.

The following districts were recommended for special consideration: Thin Vein North Field, Assumption Coal Mining Co. and Jackson County No. 2 seam, account of high-production costs, 50c. higher maximum.

There are a few other single mines, of small tonnage, at several points within the state whose claim to higher returns was considered, but whose exact status has not been established.

It is understood that a price of 50c. per ton below the above figures will in every instance be protected to the Government on all its purchases from all fields, subject to adjustment after a more complete investigation of costs. The maximum commission allowed jobbers is 25c. per ton.

But Little Anthracite in France

In addition to a few anthracite beds found in the Gard field in Southern France some small irregular pockets of this type of coal are found in regions of the Alps that are not readily accessible. From the deposit of La Mure near Grenoble an output has been attained of about 300,000 tons a year. The whole tonnage, assured and probable, of the anthracite deposits in the French Alps does not exceed 5,000,000. The figure given by some—100,000,000 tons—is extremely hypothetical.—Edouard Gruner, International Engineering Congress, San Francisco, California.

Facts About Self-Contained Portable Electric Mine Lamps

By H. O. SWOBODA
Consulting Engineer, Pittsburgh, Penn.

SYNOPSIS—*Urges that both hand lamps and cap lamps have their place in the mine. To burden a man with a lamp and battery which he must carry around all day on his head and his belt respectively reduces the output of effective energy. Other reasons are given for preferring mixed equipment of hand and cap lamps.*

WHEN the United States Bureau of Mines granted its approval for self-contained portable electric mine lamps just about four years ago, the number of such lamps in service in this country was insignificant. Since that time, however, the application of these lamps has increased materially, and today they have become a very important factor in providing light for gaseous mines. As practically no invention when first placed on the market is perfect in design as well as in detail, and cannot be made so until it has passed through many years of actual service, it can readily be understood that it would be premature at this early date to speak about an established standard practice in connection with portable electric mine lamps. Nevertheless, it should be very interesting to discuss the general development as far as it has gone and to make an attempt to lay down the lines on which this development may continue in future.

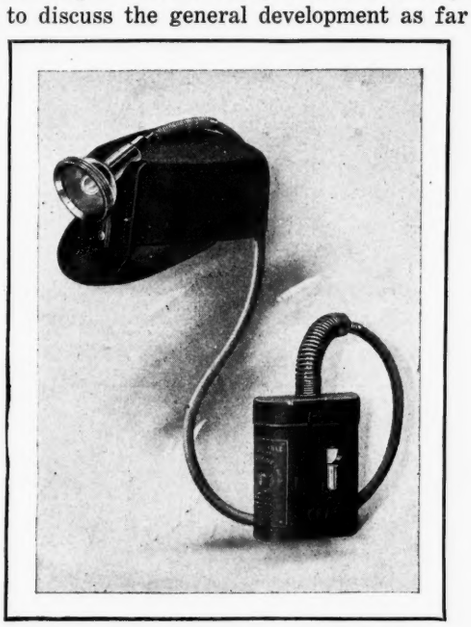


FIG. 1. CAP LAMP FOR THE MAN WHO MOVES FROM PLACE TO PLACE

A superficial study of the various designs of lamps produced in this country as well as in Europe brings out the interesting fact that the United States has originated designs on lines directly contrary to European practice; that the former has adopted the type of lamp designed for attachment to the miner's cap (see Fig. 1), whereas the latter has developed exclusively the type which the miner carries in his hand or occasionally hooks to his belt. (See illustrated initial.)

FIG. 2. MINE WORKER IN A CAP LAMP

In view of the fact that the general conditions under which portable electric lamps are used do not very materially differ all over the world, and also that each of the two types of lamps possesses certain advantages as well as disadvantages, the present contrast between American and European practice cannot well continue for any length of time and is bound to end in some compromise. That such a peculiar situation can exist at all can only be explained by the assumption that within the short time during which portable electric lamps have been in actual service neither the mine operators nor the miners had sufficient opportunity to exchange their experiences and to ascertain the most favorable conditions under which each type of lamp can be used.

As early as 1914 I made the following statement regarding the use of cap and hand lamps:[1]

[1]American Institute of Electrical Engineers' Proceedings, 1914, Part I, page 385.

Men who continually change their location in performing their duties will prefer the cap lamp, as it leaves both hands free for action; men who stay at work in the same place most of the time will favor the hand lamp, which can be set aside or hung up in the neighborhood, thus relieving them from carrying unnecessary weight.

It seems that this simple commonsense rule is about to be recognized and followed in actual practice. The superintendent of a prominent coal concern stated only recently that the coal diggers of his company, having been accustomed to Ceag hand lamps, refused to change to cap lamps. Anybody who enters a coal mine can occasionally observe a miner carrying his cap lamp in his hand together with battery and cable cord. This in itself is an unconscious admission that the cap lamp is not always the most desirable type of portable electric mine lamp. Why should miners, who only infrequently move from one place to another, burden themselves unnecessarily during the entire shift with a weight of about 3½ lb., thus to some extent hindering the free movement of their heads and bodies (see Fig. 2), so long as they can free themselves from all weight and obstacles and place a hand lamp on the ground or hang it over a nail driven into a near-by support? It is a well-recognized fact and proved by innumerable tests that a single ounce of weight added to a soldier's equipment has a material influence on his operating ability. Why should a hard-working miner not be affected in identically the same manner if loaded down with several pounds and why should his equipment not be reduced to a minimum of weight? Without doubt many miners not conversant with matters of this kind will claim that a few pounds more or less fastened to the body of a man do not influence his working ability; nevertheless the fact remains that it does.

Speaking in favor of the hand lamp, another point is of vital importance so long as a miner can stay at his work in the same place most of the time. The flux of light produced by a cap lamp is concentrated by means of a reflector to the place of work (see Figs. 1, 2 and 3). This leaves the surrounding space in complete darkness. The hand lamp, under the specifications of the Bureau of Mines, is required to supply a flux of light double that required of a cap lamp. It illuminates not only the place of work, but the entire space surrounding the miner.

A man accustomed to a cap lamp, and even the mine operator, may consider the illumination of the entire surroundings as a luxury and consequently unnecessary. Nevertheless there is no doubt that the shifting of the light of the cap lamp with each movement of the head irritates the eye and does not permit the operative to perform the work with the same ease as if the entire surroundings are illuminated, because in that case the sharp contrast between light and complete darkness is practically eliminated. Owing to the general and continuously increasing demand for more light everywhere, this point is of much importance. Like everybody else, the miner of today insists upon more light than in former days, and the miner of the future undoubtedly will not be satisfied with the illumination now provided him. A glance at the cap-lamp and hand-lamp designs will also show that the latter is the more compact and less complicated of the two. A hand lamp does not require the cable cord, which has to be protected against rapid wear by springs. Furthermore, the incandescent lamp with its protection, being mounted directly on the battery container, is more rugged than the headpiece of a cap lamp, which is intended for a miner's cap. Therefore, it is reasonable to assume until actual figures are available that the cost of repairs and renewals for hand lamps are lower than for cap lamps, provided this saving is not wiped out in actual service by the rougher handling to which hand lamps are subjected.

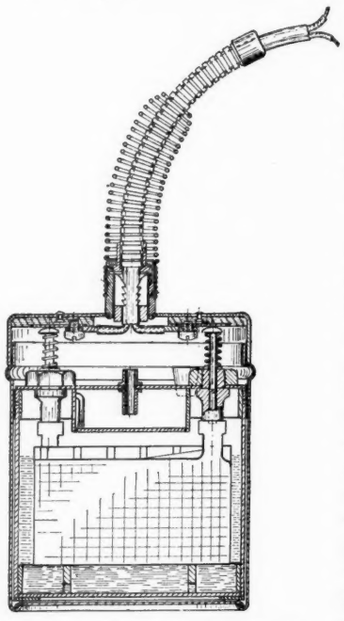


FIG. 4. STORAGE BATTERY FOR A CAP LAMP

It is quite evident that the European designers were induced to adopt the hand lamp on account of the advantages just mentioned, and the success which rewarded their efforts justifies their action. There were more than 150,000 Ceag handlamps employed in Europe before the war broke out, and at the end of 1915 more than 120,000 lamps of different makes were reported in use in England alone.[2] Nevertheless, it would be extremely unfair to condemn the cap lamp, as it undoubtedly has met with just as much success in this country as the hand lamp in Europe. There are many miners whose duties compel them to move around from place to place continuously. If they were furnished with hand lamps such men would be compelled to carry them in their hands or hooked to their belts, both of which methods of carrying the lamp are rather inconvenient. Where the lamps were carried in the hand, one hand would be kept occupied and the miner could not perform his duties as advantageously as if he had the use of both hands. Men employed in the transportation of the coal and other materials are especially handicapped by the use of hand lamps, and the lamps are then quite frequently dropped by accident. As a result they get under the cars and are completely destroyed. Such accidents, of course, cannot occur with cap lamps. Under these conditions it seems that

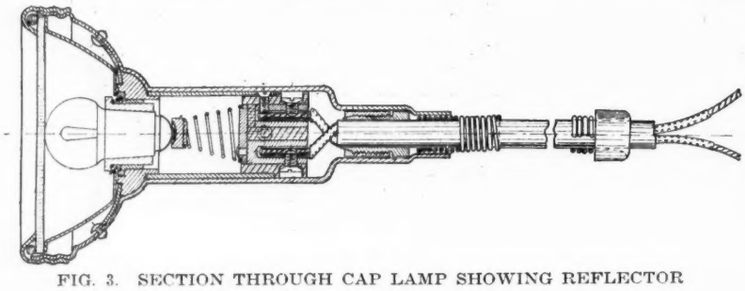


FIG. 3. SECTION THROUGH CAP LAMP SHOWING REFLECTOR

[2]Richard Koch, "The Electric Safety Lamp," "Coal Age," 1917.

neither American nor European mines are operated with the most efficient portable illuminating equipment by adhering to one type of portable electric lamp. Careful investigation of the nature of the work which the men have to perform would soon show that each man should be furnished either with a cap or hand lamp.

There is no good reason why a European miner should tie up one of his hands by carrying a hand lamp when a cap lamp would leave his two hands free for performing other labor; on the other hand, it is just as unwise to load an American miner down with several pounds of weight by compelling him to use a cap lamp if his work permits the use of a hand lamp, which he can set aside and which will not only free his hands but at the same time relieve him from any unnecessary weight.

The conditions as outlined seem to show clearly that in due time the European mines should adopt for some of their men the American cap lamp, and our mines should not hesitate to employ hand lamps jointly with cap lamps, in order to obtain the best results.

In conclusion I wish to state that the illustrations in this article were placed at my disposal by the courtesy of the Concordia Safety Lamp Co., Pittsburgh, Penn., sole manufacturers of Ceag lamps in the United States.

Flat-Car Equipment at Mines

The average coal mine has only one kind of car—a coal car. No matter *what* has to be hauled, no matter *where* it has to be hauled, the coal car is the conveyance on which it travels. And that coal car, if not exactly an elaborate, is a highly specialized piece of construction, specially adapted for the loading, hauling and, above all, for the dumping of coal and extremely ill suited in most cases for the multifarious uses that the mine foreman demands from it.

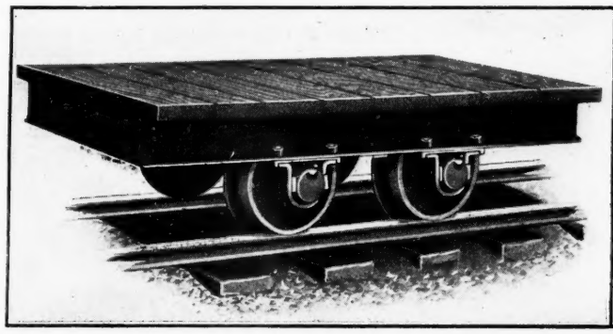
Suppose a railroad were conducted on a like plan, with only one kind of equipment for the hauling of men, coal, hay, timber, machinery, track and what not. It would seem almost impossible to operate it with such equipment, but most mines have to do business under this handicap. Of course, there is a reason for this; nevertheless, in some cases, the reason looks much like an excuse and an explanation rather than a real reason.

Surely at every mine a flat-car has its place. Some mines *do* have a car bottom on wheels—a poor excuse for a flat truck—but better for that purpose than a car not thus dismantled.

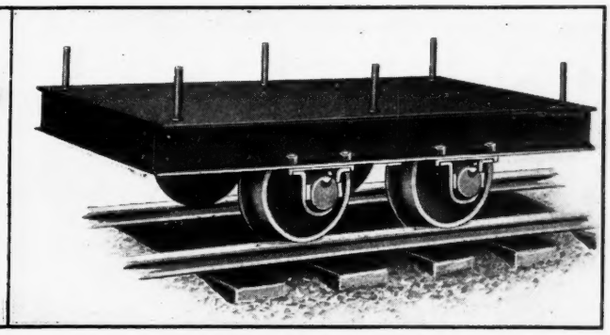
The Watt Mining Car Wheel Co., of Barnesville, Ohio, builds a car which it calls a 4-in-1 truck. It has a channel frame body with a top of wood. The wheels are solid and pressed tight on the axle, which runs on outside roller bearings. Poles in the body channels make it possible to set up six posts on top of the car.

But higher stanchions, or posts, than these can be set at the four corners, and then the car becomes suited for the transference of ties, props and wood mine rails. Finally, the sides can be boxed, and a general utility car is obtained in which small things may be hauled, such as coal, sand, ballast, road cleanings and ashes.

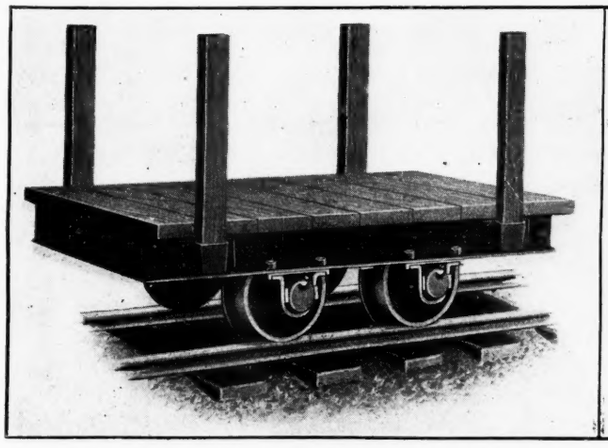
The time has come when it no longer pays to carry rail on the tops of mine cars or drop cumbrous material in the bottom of such a car and then have to lift it out with difficulty. A few trucks built for general hauling work are needed, and they will in due time be found usefully employed at every up-to-date coal-mining plant.



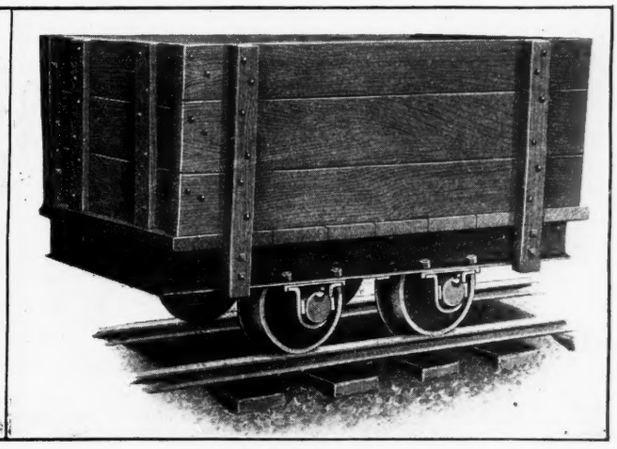
A FLAT CAR FOR MACHINERY OR CASTINGS



FITTED WITH STANCHIONS WILL CARRY RAIL



WITH STAKES AT SIDES WILL CONVEY POSTS



SIDEBOARDS ADJUSTED BECOMES ASH CAR

Electrically Operated Rock Drill

By E. M. MACKIE
Syracuse, N. Y.

SYNOPSIS — *Where rock has to be handled in a mine, the problem of drilling is an important one. Since only a few mines are equipped with compressed air, an electric drill is in most cases more convenient than a pneumatic machine. After many years of experiment, it would appear that a successful electrically driven drill had been produced.*

THE excavation and disposal of rock, in coal mining, are operations from which no revenue is obtainable. Consequently, the rock problem is frequently a serious matter to the mine manager.

If the rock is clay, shale or slate, and easily excavated, this is usually discounted because where the rock is of this character there generally has to be much expensive timbering to support the roof; whereas in mines with medium to hard rock, although the excavation is comparatively more expensive than in the softer formations, it is offset by the fact that little timbering is required, the roofs being, generally, self-supporting and safe.

If the harder rocks could be disposed of without drilling and blasting, the problem would be considerably simplified. Some day this may be possible, but up to the present time some form of rock drill has to be used. It is thus necessary for the mine manager to get the best machine for his conditions, and regardless of what these may be, he should select a machine that will give the best returns in cost per foot of drilling.

Since the introduction and use of electric power in coal mines, the development of a practical and efficient electric rock drill has been slower than the development of other types of mining machinery, due not so much to lack of effort as to the difficulties encountered. However, perseverance usually gets what it goes after, and the Pneumelectric Machine Co., of Syracuse, N. Y., now has an electric rock drill that will not only outcut any similar machine, but will also cost less, per foot drilled, for upkeep and repairs.

This machine, known as the Form D Pneumelectric rock drill, comprises an electric motor operating a small air compressor through the medium of gearing actuating a crankshaft, connecting-rod and piston of standard engine construction. On the movement of the piston toward the crankshaft a charge of air is compressed, and during this movement the hammer under the influence of atmospheric pressure on the outer end and vacuum on the inner end follows the compressing piston on its inward stroke until the compressing piston has passed and uncovered the bypass port, which permits the charge of compressed air to pass through the bypass into the space between compressing piston and hammer. As the compressing piston moves back on its outward stroke the bypass port is closed and the hammer is driven outward by the energy in the charge of compressed air confined between compressing piston and hammer, which delivers a blow under the full energy of this charge. Practically at the same moment as the blow is delivered, the hammer passes and uncovers a release port, which allows the charge of compressed air to pass out to the atmosphere. The release port is provided with a valve which, as soon as the charge passes out, seats and seals the port, so that as the compressing piston starts back on its inward stroke it cannot move away from the hammer without creating a condition of vacuum in the space between piston and hammer. The hammer thus follows the piston on another cycle as previously described.

The other undescribed part of the cycle is the charging of the compressing cylinder. This takes place while the compressing piston is moving on its outward stroke. During this movement the new charge of air passes through a valve on the stuffing-box end of the cylinder. This valve closes just before the compressing piston reaches the end of its outward stroke and remains closed during the inward, or compression, stroke.

The rotation of the steel is accomplished by pawl and ratchet, operated by a shaft running lengthwise and under the gear case and cylinder. This shaft is driven by spur gearing from the motor end of the drill. The ratchet is one piece with the chuck which carries the drill steel. Between the chuck and the end of the cylinder there is a dolly pin or anvil, and when drilling with hollow steel, using water to clean the hole, the water passes through the dolly to the steel; but when drilling with twisted or self-mucking steels, the dolly pin is solid and its use prevents cuttings from working along the steel and into the cylinder.

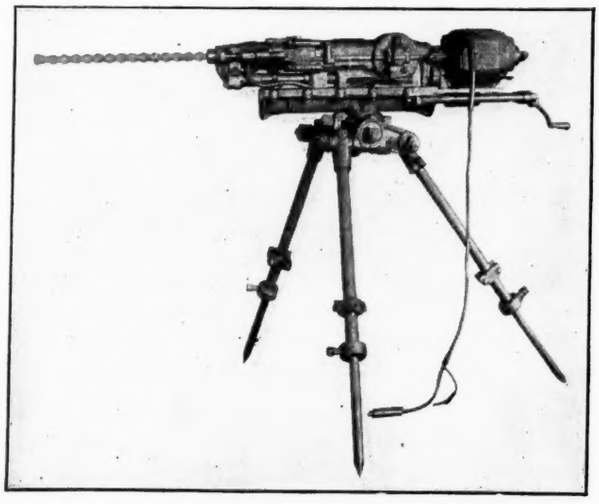


FIG. 1. ELECTRIC DRILL READY FOR ACTION

The motor for either direct or alternating current is simple, compact and ruggedly built to meet the conditions of mine service. The driving end of the armature shaft is provided with a face clutch having three jaws which mesh freely with a similar clutch on the end of the driving gear for the drill. This free and flexible driving connection permits a free running motor, free from all stresses incident to a rigid connection. It

FIG. 2. MACHINE READY TO DRILL AN UPPER HOLE

also makes easy the removal or replacement of the motor when necessary. To remove the motor all that is necessary is to loosen two nuts, swing the bolts back and slip off the motor. This takes only a few seconds' time.

In operation the drill can be used either on a column or tripod, the tripod being the most convenient mounting for ordinary mine work where the roofs are not more than 7 ft. from the floor. No weights are required on the legs of the tripod. All that is necessary is to have the tripod legs spread so that the machine will not overbalance when run out to the extreme of the feed screw. Fig. 2 shows the machine mounted on a tripod, drilling an upper hole with twisted or self-mucking steel. The control switch is provided with an attachment for hooking onto one of the tripod legs so as to be easily reached by the operator.

For an 8-ft. hole the steels are gaged to start at 2 in. and bottom at 1½ in. Actual speed of drilling is understandable only where the character of the rock is known. Eight-foot holes have been drilled in 11 min., while some have required 40 minutes.

Under normal power conditions, the drill strikes approximately 1000 blows per minute. The motor is of 3½ hp., the weight of drill without motor is 250 lb.; the motor alone weighs 90 lb. Drill parts are made from chrome vanadium steel, heat treated, and all bearing faces are hardened and ground. All bearings are provided with a liberal oil chamber; oil felts convey the lubricant to the bearings and exclude dirt. All parts are made on the interchangeable plan and are easily replaceable.

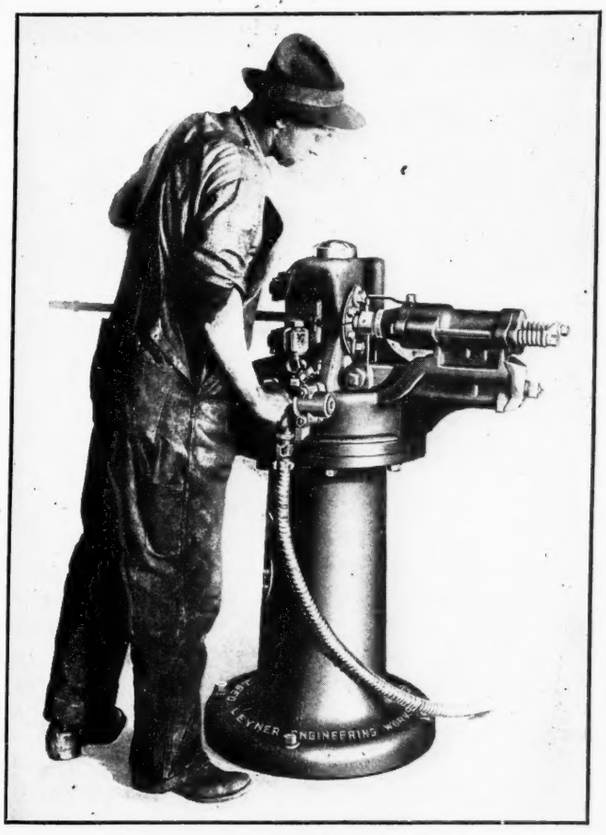
This Form D rock drill is the result of 10 years' persistent effort and development by the Pneumelectric Machine Co., which now has some 30 of these drills in use under all sorts of mining conditions. The first Form D machine has been in use for 2½ years, while each machine in operation has been under close observation. The records thus obtained are proofs of the ability of this machine to stay on the job. The cost for repairs or replacements is practically negligible. I have before me a record of work done by one of these drills at Mine No. 40 of the Berwind-White Coal Mining Co., Windber, Penn. This record covers a period from July 31 to Sept. 30, 1916. Conditions at the mine at that time were such as enabled the drill to be used in a wide range of work, taking down roof, lifting bottom, opening roomnecks and excavating a sump. About 40 per cent. of the holes were bottom holes; there were 41 full- and three half-working shifts. The total footage amounted to 2000 ft. 5 in., giving an average total per shift of 49.4 feet.

The total footage from shifts in which 50 ft. or more was drilled—1116 ft. 8 in. in 20 shifts—gives an average of 55 ft. 8 in. per shift; and assuming 8 hours as a fair average of the working time consumed in setting up, drilling, moving from heading to heading, clearing tracks, etc., gives approximately an average of 7 ft. per hour. An inspection of the detailed report for each shift shows a clean record for the drill, which since that time has been doing all the drilling at Mine No. 40, which is by no means a small development. It should be understood that the figures given from this report include all delays from any cause, and do not indicate actual speed of drilling but an evidence of what the machine can do. Other reports of drilling in hard sandstone show an average drilling speed of 4 to 6 in. per min., or a 7-ft. hole in 25 min., including the time consumed in changing steels.

Leyner Small Drill-Steel Sharpener

It has been conclusively demonstrated that the use of machine-sharpened drill steel, on account of the uniformity of results secured, decidedly reduces the actual drilling time, while the wear and tear on the drilling machine is correspondingly lessened.

Heretofore these benefits have been restricted to the users of a considerable number of steel, because of the relatively large investment required for a drill sharpener



DRILL SHARPENER IN ACTION

as compared to the volume of work performed. A new sharpener has recently been placed on the market by the Ingersoll-Rand Co., known as the Leyner jack steel sharpener, which is of such a size as to make its employment advantageous to users of even two or three drills. This machine is a small edition, with suitable modifications, of the standard No. 5 Leyner sharpener.

This new machine is designed to handle the small sizes of steel such as are used with Jackhamers, stope hammers, plug drills and the like. Its capacity is as follows: Maximum steel size, round, cruciform and light section twisted or banded steel, 1⅛ in.; maximum diameter steel, hexagon or octagon, 1 in.; maximum diameter square steel, ⅞ in. The sizes of bits handled by this machine are as follows: Maximum diameter of 4-, 5-, 6-point, V, X, and single or double chisel bits of standard 14-deg. taper, 2 in.; maximum diameter of Carr, or bits of other than 14-deg. taper, 1⅞ in. Shanks may be forged from the smaller sizes of steel on this machine.

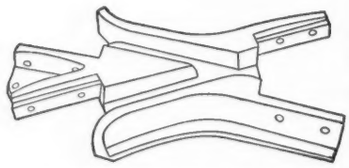
As may be seen in the accompanying illustration, this sharpener is of simplified design and is extremely compact. Its weight of 925 lb. permits ready transportation when this is necessary. No special foundation other than a plank support about 3½ ft. square is required.

This machine employs a single piston rod on the clamping piston. This allows the die and dollying hammer to be so located as to operate immediately under the eye of the attendant.

An entirely inclosing die is employed, as is the case with the larger Leyner sharpener. The metal is thus thoroughly compacted under the action of the dollying hammer. The completion of the sharpening operation within the die effects the same correctness of gage and exact duplication of bits of any width, as is secured with the larger machine. A single lever controls both clamping and dollying. It is claimed that this conserves muscular effort as well as the time of the operator. The entire machine is 4 ft. high, 3 ft. long and 2 ft. 4 in. wide. It operates on compressed air.

The Titan Frog

The frog here illustrated is known as the Titan, and is made in one piece, of titanium heat-treated steel. Bolts are furnished to make connections with rails. It is unique in its method of making connections, as the end extensions form a lap or bridged joint, the section of the extension conforming to the rail section with which the frogs are used. These bridged extensions are inclined at the extreme end to take care of worn treads of wheels. This type of fastening eliminates the use of fishplates. The bearing or running surface of these frogs is wider than the width of the head of a rail, thereby increasing the wearing surface. These frogs can be spiked down all round, as they have a flange the same as a frog made of rail. They are made for any angle and to fit any rail section. They are made straight, so that they can be used for either a right-hand or left-hand turnout. They are being used by several coal companies and are the product of the Weir Frog Co., Cincinnati, Ohio.



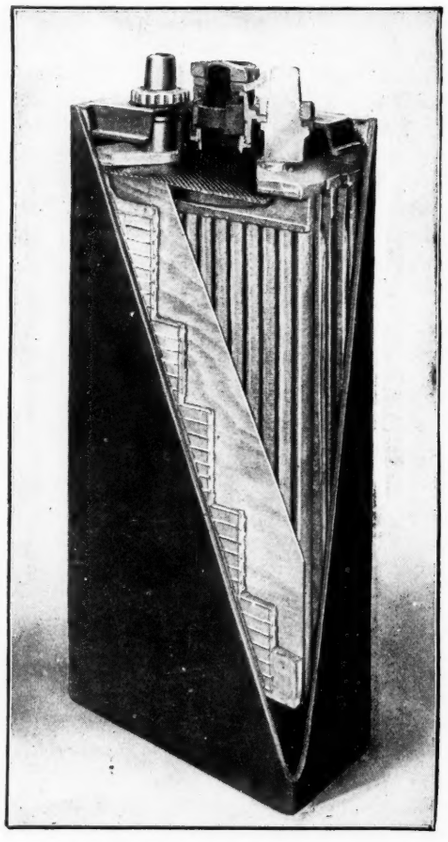
TITANIUM STEEL FROG

Storage Battery for Mine Service

SYNOPSIS — *The difficulty in operating lead storage batteries has been to eliminate the accidents due to ignorance and carelessness, and to prevent the material of the positive plate from sloughing off and piling up in the bottom of the jars. It has also been hard to secure a rugged battery which would stand the jars incident to locomotive service.*

ALL our energy in education around the mines has gone to the development of the competent mine foreman. We either want in that position a man of superlative merit, who is well versed in electricity and mechanical engineering, or we must have men around the mine whose qualifications should largely surpass those of the mine foreman.

Every new piece of equipment put into our mines is face to face with this trouble—incompetent and careless handling—and the manufacturer has only two ways of meeting the trouble. He can either leave the field or he can make his machinery so nearly foolproof that it cannot be wrongly used. There is always a time, however, when new machinery has not those qualities. The manufacturer demands some knowledge, care and diligence of the machine user, and he does it just at the time when these qualities are rare. After a while, when the tyros on the plant are getting to understand



BATTERY SHOWING THE POSITIVE PLATE AND THE NEW BATTERY COVER

their work; when, by a process of hiring and firing, we have placed the right men in care of the machinery, then comes the foolproof mechanism that makes such caressing attention unnecessary. But until that time the best results are not likely to be obtained.

The storage battery is successfully meeting with the difficulties connected with inexpert operation. One of the weak spots in earlier cells was the inefficient cover. The cover has several duties: It must keep out dust and other impurities, it must exclude water, and it must retain the electrolyte in the cell.

The Ironclad-Exide battery has been fitted with a cover that performs these duties and in addition makes it impossible to put an excess of water in the cell. The cover is dished and fits down into the cell so that when the cell is closed there is no space for the collection of moisture or dust. In the cover is an air lock *A*, shown in a position which closes the air passages *BB*. When the air lock is in this position and the terminals of the cell are in place, it is impossible to overfill the cell, as *CC* becomes an air-tight cylinder as soon as the water rises to the proper level.

When the plug *E* is removed the air lock *A* is of necessity turned so that the air passages *BB* are closed.

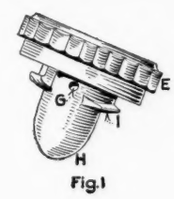


Fig.1

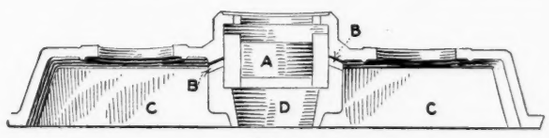


Fig.2

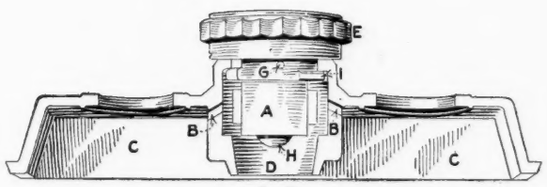


Fig.3

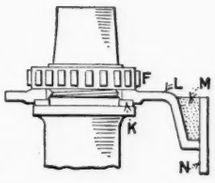


Fig.4

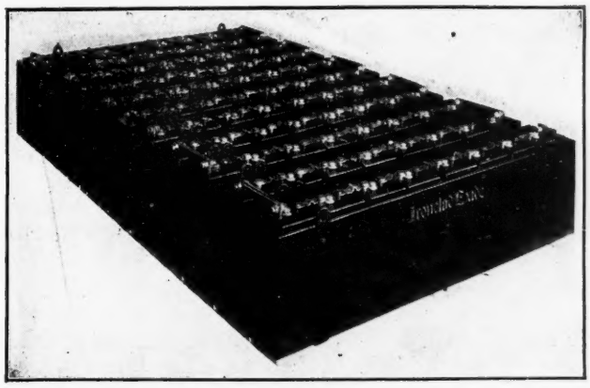
A COVER WHICH REGULATES FILLING AND PREVENTS SPILLING OF ELECTROLYTE

When water is poured into the cell it cannot rise in the space *CC* so as to completely fill it. As soon as sufficient water is poured in the water rises in the filling neck *D* and can readily be seen. Should the filling be continued, however, the excess will be pure water only, not electrolyte.

When the plug *E* is replaced the air lock is turned so that the air passages *BB* are opened. The air escapes through the vents *G* and *H* in the air lock. As soon as that takes place the solution drops to the proper level in the filling neck *D*.

The strong discontinuous thread *I* is simple and rugged in construction. There is no risk of threads getting crossed as with more usual construction, nor can the plugs stick or break. The filling neck *D* is large, so that the cell can be filled without spilling fluid.

Fig. 4 shows how the cover is fastened to the cell terminals. The sealing nuts *F* on the terminal posts hold the cover *L* firmly in place while the rubber washers *K* around the posts make an air-tight joint. A sealing compound *M* is run around the edge between the cover *L* and the rubber jar *N*.



A NEST OF CELLS FOR LOCOMOTIVE SERVICE

In the charging and operating of a cell provided with a cover of this efficient type, the electrolyte is not spilled. Hence, there is no short-circuiting from this cause, no rotting of the battery trays nor any corrosion of the metal parts.

The positive plate of lead storage batteries gives much trouble by continually sloughing off. To avoid this the Ironclad-Exide battery has the active material in hard-rubber slotted tubes, the slots being so fine that the material cannot readily work out. When the material gathers in the bottom of the cell it is necessary to clean the battery, and it is thus temporarily put out of commission. By providing that no dust can get into the cell and that sloughing will not take place it is possible to avoid these frequent cleanings and make the maintenance of the battery more economical. As a result of these and like provisions 175 storage-battery locomotives equipped with Ironclad-Exide batteries are now in service in the coal mines. Forty per cent. more batteries of this type were distributed in the first five months of the present year than in a similar and equal time in the year just past.

When all installations now ordered are completed, there will be 325 coal-mine locomotives in service with Ironclad-Exide batteries. Today storage-battery locomotives are being used both for gathering service and for main haulage. As a storage-battery locomotive will do the work of three to eight mules, it displaces a large number of drivers who can be more profitably employed at the coal face. This is an important matter now that every mine is short of men.

Lignite as Much Like Wood as Coal

In Saskatchewan, Canada, a xyloid lignite is found varying from 7 to 20 ft. thick and about 80 ft. below the level of the plain. Numerous smaller seams are found below that mentioned, one being 456 ft. down, and drillers report one at 900 ft. But the lignite is truly xyloid, the biochemical process operating in the transformation of peat into coal being arrested before the transformation of the vegetable matter had proceeded very far; hence the woody structure is well marked.

Machine-Loading Economics

SYNOPSIS—*The present labor shortage has emphasized the advantage of machine loading. Several factors have militated against this method of loading in the past. In order to employ loading machines successfully, it is often necessary to adapt the haulage system to their use.*

THE desire to lower mining costs, coupled in many cases with a scarcity of labor, has fixed the attention of mining men all over the world upon modern machinery as one of the most important means to decrease the expense and increase the output of their mines. Trolley and storage-battery locomotives are taking the place of mules; coal cutters are being used and improved continually, and hand drilling is at many places being supplanted by air or electric machines. But hand shoveling of the coal into the mine car is still carried on as it was a hundred years ago, except in a few places where the management has had sufficient foresight and courage to break away and make such departure from old-established methods as to make it possible to adopt machine loading. During the last few years several attempts have been made to introduce machine loading, but either the machines tried have not been of proper design to overcome the difficulties encountered, or labor conditions at the mines when such trials were being made were not of such a nature as to make machine loading advantageous enough to warrant its adoption.

This has been especially true when machine loading necessitated radical changes in the general operation of the mines. However, labor conditions at the present time are so seriously troubling the large mining companies that they are all beginning to realize that even if certain changes must be made to accommodate machine loading, and even if machine loading, when adopted, fails to lower the loading cost, the need of increasing the production, or even of securing a normal output, necessitates the use of some device for placing the coal on the mine car by mechanical means.

The Halby shoveling machine, which is the latest one designed for loading coal into mine cars, has been investigated by several of the largest mining companies and contractors, not alone in America, but also in foreign countries. It has been pronounced to be the machine which comes closest to meeting the requirements. Although new, and not yet generally known to the public, having only recently been made ready for the market, this machine has been developed during the last three or four years and has been given severe trial in different mines.

The machine was invented by V. G. Halby for use under the severe conditions prevailing in the iron and zinc mines. During the last year a special machine has been built and tried out successfully in a coal mine of the Consolidation Coal Co. at Jenkins, Ky., and although the conditions there prevailing are severe, more so than generally found, the officials have not hesitated to pronounce it the best machine ever tried. They expect it to solve their labor troubles.

This machine is now being manufactured in Marquette, Mich., by the Lake Shore Engine Works, and a special shop is being built to take care of the increasing demand. Eventually the entire plant, which is now also turning out mining machinery, will be given over to the manufacture of this one machine.

The Halby shoveling machine, as shown in the accompanying illustrations, is a substantial piece of equipment built to meet the severe conditions always encountered in mining operations. It has a weight of 16,000 lb. to 20,000 lb., depending on the size and model, and will load a ton of coal a minute. The output from the mine under actual working conditions will of course depend on the car service, but even under unfavorable circumstances 150 tons or more should be shoveled during each shift.

Shovel in position to lift a 400-lb. lump — Position of machine when feeding conveyor

A MACHINE WHICH WILL SHOVEL 150 TONS OF COAL A DAY EVEN UNDER UNFAVORABLE CONDITIONS

The machine is built in four sections, each section being a separate unit in itself. This design makes it possible to dismantle the machine and take it underground with little inconvenience. After they are underground, the four sections can again be assembled in a short time. As will be seen from the illustration, the front end of the machine is provided with a large dipper, which is operated by a simple but effective mechanical contrivance in such a way that when working it imitates the motion of a hand shoveler.

The entire machine is designed so that it moves continuously forward and backward on the track. Every time the dipper is in its lowest position the entire machine is caused to run forward under the coal. At the same time the dipper has an upward motion, so that the load is raised and discharged onto the lower end of a belt conveyor, which, in turn, conveys the material to the rear of the machine, where it is discharged into the mine car.

Only one man is required for actual operation, but it has been found that one or two men are generally needed at the rear end of the machine, particularly for placing the coal properly in the car, and also for quickly shifting the cars when loaded.

The machine will clean up a width of approximately 7 ft. to each side from the center of the track, and will handle lumps almost the size of the dipper, or pieces up to 300 or 400 lb. in weight. However, the lifting power at the end of the dipper is sufficient to give an upward pull of approximately 3000 lb. Thus, in case coal is not properly broken loose, the machine has power enough to rip it out of the face.

Most of the machines so far built have been provided with 20-hp. electric motors, but the Lake Shore Engine Works are prepared to furnish air drive if this is desired. The machine is not anchored to the track when operating, but is designed in such a way that the center of gravity even when digging out to the side always falls between the two rails.

The traversing speed of the machine when moving from one place to another is approximately 100 ft. per min. In loading out from rooms at the Consolidation Coal Co. mine the machine was generally moved from one room to another in about 6 to 8 min. under its own power, the distance traveled being over 300 ft. If necessary, the machine can be transferred by an electric locomotive.

This machine is built of the best material which can be secured. S.K.F. ball bearings, Diamond roller chain, Hyatt roller bearings and Cutler-Hammer control apparatus are used in its construction, and the selection of these tried and proved details indicates the attention given to efficiency and substantial design. All the shafts are made from nickel steel; all the gears are of steel, some of them special heat-treated. Five clutches are employed, each being a duplicate of the others; in fact, throughout the entire machine a special effort has been made to use duplicate parts wherever possible, thus making replacements easy.

A worm-gear drive is employed on the truck. This is of the Timkins-Detroit Axle Co.'s design and manufacture, the worms being made from vanadium steel, heat-treated and hardened. The axles are of nickel steel, mounted in high-duty Hyatt roller bearings.

These loaders are built in various sizes, so as to accommodate the different conditions prevailing. So far machines have been built which will work successfully in coal as low as 5 ft. 6 in. They are also built to accommodate the different track gages from 24 in. up to 48 in. or even more.

The Lake Shore Engine Works have orders at present for these machines to go into coal mines in Pennsylvania, Kentucky and Utah, as well as for salt, iron and other mines. The demand due to acute labor shortage will tax the capacity of the plant for the next five months, but preparations are already under way to increase manufacturing facilities so that it will be possible to supply the demand. Those interested in this method of machine loading can obtain full information by writing the Lake Shore Engine Works, Marquette, Michigan.

Handling Mine Water

By H. E. COLE
Pittsburgh, Penn.

SYNOPSIS—*A brief discussion of the various types of pumps suitable for coal-mine service. A comparison of the different styles is made and suggestions are given with reference to the care and operation of pumps.*

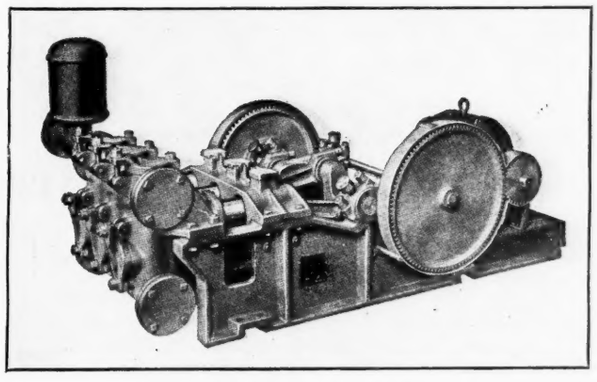
THE problem of handling water in coal mines is one of prime importance. The kind of pump best suited for any operation naturally depends upon the character of the duties the machine must fulfill. For gathering purposes, piston pumps are generally satisfactory, as they seldom require priming. They are nearly positive in their action and will handle a large amount of air coming in with the water. Such pumps also will take care of small particles of coal and dirt, although it is always advisable to have a suitable strainer on the suction pipe.

Plunger Pumps

Plunger pumps are likewise adaptable for gathering purposes. They are usually heavy in construction and can be built to withstand the action of acidulous mine water more succesfully than piston pumps. The chief disadvantage of the plunger pump is its higher first cost; also its higher cost of installation. Such pumps are usually constructed for pressures averaging twice as great as those prevailing with piston pumps.

Centrifugal pumps may be used for gathering purposes, but they usually require a great deal more attention, owing to the fact that if the water is lowered so that air comes into the suction pipe the pump immediately stops delivering any water and simply churns the water that is in the pump shell, without accomplishing any useful results.

With centrifugal pumps it is also desirable to keep the amount of suction lift at a minimum, and with a comparatively short suction. With the piston or plunger pump, where there is not much suction lift, a suction line of 1000 ft. or even more is often used, and in a great many instances various branches on the suc-



A TRIPLEX BACK-GEARED PUMP

tion intake, so that the water can be taken from several different places either at the same time or separately.

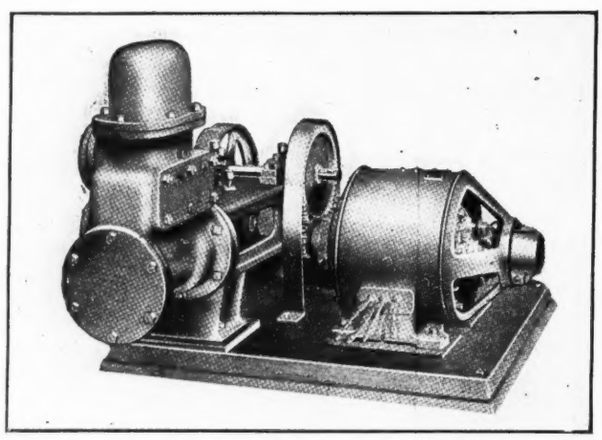
Care should be taken, however, in any case to see that the suction lift is kept down to a practical working point, preferably not over 20 ft. in any instance. In general, I would say that centrifugal pumps should not be used for gathering service unless the conditions of operation are practically constant, the water being taken from a fairly good-sized sump and the pump designed for the particular conditions of operation.

Rotary pumps are frequently used for gathering purposes, but in general they are not adapted to coal-mine service due to the fact that the clearances between the cams and the pump shell are usually small; and being susceptible to small solid particles, they are usually quickly worn out. There are exceptions to this statement, however, as there are on the market today more than a hundred different styles of rotary pumps.

Station Pumps

The term "station pump" is very broad, but in this instance I mean any pump which is to be located in a relatively permanent position, taking water from the same location and discharging it to a fixed point, so that in securing a pump a superintendent knows what conditions he has to meet and can specify clearly the conditions of operation. For this service, I feel it would be best to describe briefly the principal points of advantage and disadvantage in the various types of pumps used for this service.

Piston pumps are adapted for comparatively low heads, preferably not over 125 ft., and are particularly useful where a certain amount of air will at times come into the suction pipe with the water and where comparatively little attention could be given. The moving parts being comparatively light, a piston pump can, when motor driven, be started automatically with good

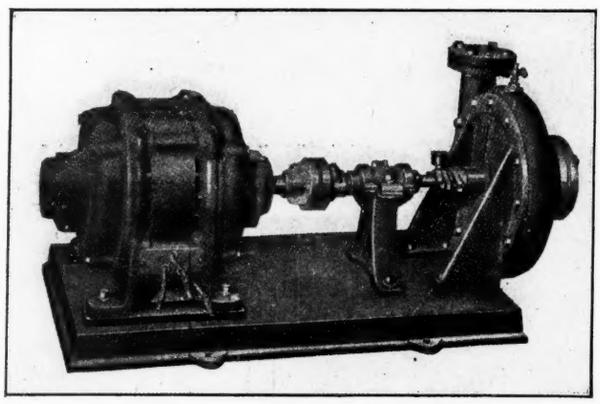


SINGLE-CYLINDER GATHERING PUMP

results, and in many instances operators use motors which are attached directly across the line, so that when the power is off the line the pump stops, and when the power is again turned on the pump starts almost instantly.

The electric motor-driven, single-acting, triplex plunger pump is more nearly the universal type of pump for handling mine water than any other pump yet designed. It is strong in construction, easy to keep in operation, nearly positive in its action, is constructed to withstand average mine water, produces comparatively steady flow and requires little attention. These pumps can be built for capacities as low as desired, and, if necessary, will handle 1000 gal. or more per minute.

For mine service, it is usually desirable to secure pumps furnished with solid bronze plungers, bronze-lined stuffing-boxes and glands. If the water is acidulous and the pump is comparatively small, then it is advisable to use a pump with the water end, both the cylinder and the valve chamber, made entirely of anti-



SINGLE-STAGE CENTRIFUGAL PUMP

acid bronze material. In case of a larger size pump it could be either in bronze or cast iron, carefully and effectively wood-lined.

Centrifugal Pumps

Where conditions are suitable, the centrifugal pump offers the cheapest method of handling water to a high head. With this type of pump the suction lift should be comparatively small and the suction pipe absolutely tight. The total elevation, including friction, should not exceed 60 ft. per stage. This style of pump can be made for handling practically any kind of water, being constructed of cast iron or anti-acid bronze as conditions may require.

One of the principal advantages of centrifugal pumps over any other type is that with this pump a far greater capacity can be obtained for the amount invested than from any other ordinary type of pump on the market. Pumps are now being constructed with high efficiencies which compare favorably with piston or plunger pumps. Where the water to be handled is extremely acidulous and nearly continuous service is required, a wood-lined plunger pump is found to give satisfactory results. A centrifugal pump with an all-bronze water end being much cheaper in first cost, it will generally serve admirably as a spare and take care of any surplus in very wet periods.

Points To Be Remembered

The friction of water in pipes is often an important factor, therefore the necessary size of pipe for any given pump should be carefully considered. The larger the pipe the slower the velocity for a given quantity, and consequently there is less friction in spite of the fact that a larger quantity of water in pounds is actually in the pipe at a given time.

As zinc is especially susceptible to the action of acid water, its use in metal should be almost if not entirely

eliminated. Ordinary yellow brass and tobin bronze usually contain a very large proportion of zinc, consequently far better results may be obtained by the use of anti-acid bronze, which cannot be drawn into bars or tubes but has to be cast. The results, however, usually justify the additional expense.

The uniform flow of water in a pipe means the least power required, and an intermittent flow or spasmodic action of the water in the pipe means a great loss of power and often very high pressures on the pump. This can usually be eliminated by the use of a large air chamber on the discharge of the pump and one or more air chambers on the discharge line from the pump to the final point of discharge. If the suction line is very long, an air chamber on the suction pipe close to the pump will pay for itself in a short time in the saving of wear and tear on the pump and in a larger quantity of liquid handled.

The practice of tapping an air chamber near the top and inserting a pet-cock or valve to allow the air to escape is generally dangerous; and necessary steps should be taken to keep the required supply of air in these chambers, because air chambers entirely filled with water are usually worse than no air chamber. A sufficient supply of air can generally be taken into the pump by placing a pet-cock in the suction line near the pump, so that a small quantity of air will be drawn into the pump all the time when running. This valve should be of the ball-check variety and should not be used on any such pumps as become air bound easily. Throttling the discharge of any pump means additional friction, and with a reciprocating pump it means that more power will be required; but with a centrifugal type of pump the quantity of water delivered will be less, with a consequent reduction in power required, though not in the same ratio, owing to the decreased efficiency.

The Care of Electric Motors

Electric motors have proved of great benefit in solving mine-pumping problems. Care should be taken that motors shall have plenty of reserve power to take care of the service required, and to keep motors dry and out of the dust. Sparking at the brushes of a direct-current motor either indicates an overload or incorrect position of the brushes with respect to the commutator, and should be remedied at once.

High-lift centrifugals usually require high-speed motors operating on the smaller pumps, usually at a speed of 1750 r.p.m.; but being direct-connected through flexible couplings and requiring no gearing, the results are usually very satisfactory.

High-speed reciprocating pumps usually secure capacity at the cost of upkeep and efficiency, and as a rule should be avoided. A piston or plunger speed of 60 ft. per min. is the limit of good practice on pumps of 6-in. stroke or less, while 80 ft. is satisfactory for pumps with a stroke of 8 in. or longer.

Problems in Leather Belting

SYNOPSIS — *The inequality in the fitness of hides for belting, the undesirability of some parts of all hides for that purpose and the difficulty of knowing a good piece of leather from a poor one makes it hard to buy a belt except on the basis of the responsibility of the seller. When needed, pulleys may be given a nonslipping pebbled face, and belts apparently worn out may be fitted for a life of further usefulness.*

THE modern coal mine is successful or unsuccessful largely in the degree in which it is mechanically efficient. No wonder therefore that coal-mine managers are devoting more and more attention to mechanical details. The problems of transmission should not be overlooked in this connection. A slipping belt causes much loss of power and when it occurs between the engine and the generator it reduces efficiency in direct proportion to the whole output of energy. Even the older types of machinery are entitled to satisfactory belting, for their productive capacity is as much dependent on that provision as if they were the most modern and economical of units.

The question of belting may be regarded as of minor interest to the coal-mine manager, but it has an extremely vital bearing on his costs, for unless he secures the highest quality of belting the depreciation will be abnormally high, as the atmosphere in and about the mine is peculiarly destructive to the texture of ordinary belting, because of the dust-laden mine air.

This dust, falling upon the surfaces of the belting, abrades the surface where the belt is in contact with the face of the pulley. The driving surface then becomes a grinding surface and the belt is subjected to the cutting action of millions of tiny particles, scratching, cutting, tearing and biting at the leather with every revolution of the pulley.

Wherever coal is mined, transported, broken, conveyed, cleaned, loaded or otherwise handled, wherever the mine air travels or the wind blows from the tipple, the atmosphere is charged with this abrasive dust which imposes the severest kind of tax upon the belting. As a result it must possess not merely sufficient stamina to do the ordinary work of driving the machinery, but have the sturdiness and rugged enduring power to grind these deposits of dust against the pulley faces without being itself torn and mutilated.

Almost all brands of leather belting, when new, present much the same appearance to the inexperienced eye, so it is of the utmost importance that the buyers of leather belting learn to discriminate between a high-grade leather belt and an inferior one.

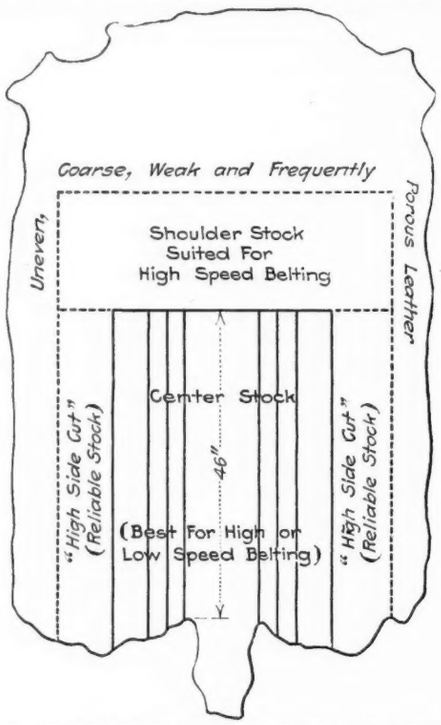
The hide of a full-grown bull, while it affords an effective protection for an animal which is by nature a fighting brute, does not make the highest quality of leather. It is coarse in grain and irregular, and it can by no means be tanned and curried so as to acquire the fundamental qualities that are characteristic of the higher grades of leather.

A cowhide, on the other hand, is deficient in the same elements that are present to an excessive degree in the hide of a bull. For this reason, leather made from

cowhides cannot be fabricated to give efficient service in coal-mine transmission. The hides of three- or four-year-old steers have been found to be of the highest quality not only because of their pliability and strength but more particularly because their texture is extremely smooth and uniform and practically without large pores.

That part of the hide which covers the region of the backbone from the tail to the shoulder is the prime cut for the manufacture of leather transmission belting. Where the shoulder begins the hide becomes less valuable, less strong, less uniform. The exact length of center stock that can be efficiently utilized for the manufacture of belting will, of course, vary with the size of the hide. But, owing to the element of human fallibility that enters into any selection that is left to the judgment of the individual workman, however skilled, the best manufacturing practice has prescribed that no cut longer than 46 in., measured from the tail, be used.

For the same reason, no flank or belly stock should be used for the manufacture of leather belting that is



OUTLINE OF HIDE SHOWING LOCATION OF BEST CUTS

to carry heavy loads or to work under the exacting conditions that prevail in and around the average coal mine.

Because it is comparatively easy for the beltmaker to treat the inferior grades of leather so as to give them much the appearance of the finer grades, the buyer of transmission belting for coal-mine installation should always confine his purchases to concerns of established and recognized responsibility.

There is a temptation for beltmakers to treat the poorer cuts of hide with mechanical stuffers or fillers, closing the pores and imparting to the leather the appearance of smoothness and uniformity characteristic of center stock. A few weeks or months of actual service in the dust-laden atmosphere of a coal mine is usually sufficient to reveal the true character of any leather belt of this kind. The grit quickly grinds out the fillers, leaving the natural pores of the leather open to attack. As the dust replaces the stuffers the myriad of sharp, gritty particles cut into the surrounding fibrous leather, shredding it and causing it to lose its grip on the pulleys. Slippage then begins. Delays are necessary while the engineers "take up" the slack. Time is lost and production retarded.

A slipping belt does not always imply that the belting is of inferior quality, however. Improper installation, inadequate contact surface, overloading, excessive speed, faulty alignment of shafts—any or all these factors may be responsible for many of the transmission losses commonly attributed to defective belting. Or the belting may become soaked with oil and caked with dirt by long exposure. In this event the leather will become soft and flabby and its driving power greatly reduced.

For defects of the first class, the engineer in charge of plant equipment is primarily responsible. If he is not entirely familiar with the laws governing the selection of belt sizes and installations for various loads, pulley speeds, etc., the engineering department of any responsible leather-belting concern will always be at his command for information and advice.

The use of belt dressings to give increased tractive power to troublesome belts is a simple expedient that is frequently effective. But the utmost care should be taken against the use of resinous compounds of unknown reliability as such treatment is likely to result in more harm than good.

Hard service and improper installation are not the only causes of belting inefficiency in the coal mine. In the washery, for example, the leather belt suffers from a combination of ills peculiar to such an environment. The atmosphere is saturated, even supersaturated with moisture. The spray from the nozzles above the jigs imposes a serious handicap on the leather belting. Moisture collects in globules on the leather and not infrequently the dampness penetrates into the leather and more particularly into the seams and laps where the various strips come together. Power losses in such cases present a serious problem and the cost of repairs and replacements amounts to an excessive figure.

The only solution to this problem is to be found in the use of thoroughly waterproofed leather belting. This is a specialty of great value to the coal mine, as it overcomes all the difficulties encountered in the washery. The leather is treated, both before and after fabrication, to a scientific waterproofing process that renders it absolutely impervious to moisture. The cement used in binding the strips of leather together is also unaffected by water. Leather belts of this character are frequently installed to actually work under water.

Mining engineers should remember also that many a good leather belt is condemned and discarded long before its proper life of usefulness has been exhausted.

If you find a belt that appears to have outlived its usefulness, examine it carefully to determine whether the defects are not more apparent than real. If the structure of the belt is still fundamentally sound, the grease can be entirely removed, the parted joints and seams can be recemented and the entire belt can be refinished and returned to duty, capable of giving satisfactory service for a long time to come. The cost of such treatment is comparatively slight. We are indebted to the Bradford Belting Co., of Cincinnati, Ohio, for the information contained in this article.

Mining Efficiency Through Adequate Equipment

By W. T. Bylund
Newark, N. J.

The problem that confronts coal-mining companies today can be expressed in a few words—"mine more coal with fewer men." Taking this as a subject, I will endeavor to tell about one special kind of equipment that has helped many coal operators to mine more coal with fewer miners.

It is admitted immediately that roller bearings for mine cars are not the ninth wonder of the world. Yet, those who have used them claim that these bearings are better than plain boxes and that there is no reason why they are not just as necessary on a car as wheels.

No man would think of pulling a mine car on skids. He feels the necessity of wheels because he knows that rolling action is better than sliding action. Then why not go further and substitute rolling action in the bearings of the wheels? They slide on the axles, don't they? Of course they do, and even though well oiled the friction of the bearings cannot be entirely eliminated.

The companies manufacturing roller bearings have been telling their story over and over again. They will keep on doing it because they have faith in the idea and, more important still, they have faith in the product. I was talking to one mining man the other day and he said that rolling bearings for mine cars must be good. "If they weren't," he said, "how could the companies keep on telling the mining men that they should use them?"

Roller Bearings Should Be Either Boosted or Killed

Somewhere, and this seems to be the best place, I want to say that there are only two alternatives to this roller bearing proposition—either help it along or kill it. Give roller bearings a fair trial. Feel that progress can depend on them. In short, make the manufacturers show results. If they don't, kill the idea.

Next to having confidence in roller bearings for mine cars a carefully prepared plan for changing over the old cars is the most important item to be considered. Just what is meant by this plan may be explained by the following discussion.

The cost of changing over each car to roller bearings, (I am taking the cost of Hyatt roller bearings, because I am more familiar with this type of bearing, and I am taking the wheel application) is about $50. The total cost of roller bearings for 500 cars would thus be $25,000.

The scrap value of the old axles, journal boxes and wheels is as follows:

1,000 axles,	100 lb. each, at $20 per ton	$1,000
2,000 boxes,	25 lb. each, at $15 per ton	375
2,000 wheels,	135 lb. each, at $15 per ton	2,025
		$3,400

The actual first cost of the roller-bearing installation would then be $25,000 — $3400 = $21,600. The interest on this investment is $21,600 × 6 per cent. = $1296 per year.

Let us now assume that we can wipe out the initial investment by creating a sinking fund. To provide a sinking fund for $1000, for example, over a period of 10 years, which is the conservative life of the bearings if properly used, we must lay aside $75.87 each year. This is based on an interest rate of 6 per cent. For $21,600, we must lay aside $1638.79 each year.

The interest on $21,600 and the sinking fund amounts yearly to $1638.79 + $1296 = $2934.79. To pay for this a good saving must be made by the roller bearings. Let us calculate what this saving amounts to in the case of 500 cars.

Power costs, say $0.01 per ton of coal hauled. Drawbar pull per ton (plain bearings) equals 32 lb. + 20 lb. for every 1 per cent. of grade. Drawbar pull per ton (Hyatt bearings) equals 13 lb. + 20 lb. for every 1 per cent. of grade. These figures are from dynamometer tests made by P. B. Liebermann, chief engineer of the Hyatt Roller Bearing Company.

The saving in drawbar pull equals 52 lb. — 33 lb. = 19 lb. per ton hauled up a 1 per cent. grade. The saving in power = $\frac{19}{52}$ × $0.01 = 0.4 mill per ton hauled.

Each car, let us assume, hauls 6 tons per day. The saving in power per year with 500 roller bearing cars = 0.4 mill × 6 tons × 300 days × 500 cars = $3600.

But this is only one item. Let us now take up the oil and labor that roller bearings can save.

High Cost of Oiling Mine Cars Daily

Plain-bearing cars require oil once a day. It takes two men at least to attend to the oiling. The cost of oil and waste for 500 plain-bearing cars per year equals $525. Cost of two men per year equals $1200. Total, $1725. The cost of oil and labor for 500 roller-bearing cars is $290. The saving is thus $1435.

These figures are the results of carefully made tests. With plain-bearing cars it is necessary to use two men at the tipple, in order to push the cars. Since roller-bearing cars push with one-half the effort required for plain-bearing cars, it takes but one man to handle the roller-bearing cars at the tipple. For the same reason, the services of one cager can be dispensed with at the foot of the shaft.

The saving on these two men equals $1875 per year, figuring that the man at the bottom costs $2.75 per day and the one at the top costs $3.50 per day.

The total yearly saving on 500 roller-bearing cars is thus: Power, $3600; lubrication, $1435; labor, $1875. Less a yearly cost of $2944.79, or $3965.21.

In addition to this saving, there are other economics that cannot be put down in dollars and cents. Among these might be mentioned: (1) Roller bearings do not stick in cold weather, (2) the labor will be better satisfied, (3) the cars will have longer life and (4) repair bills will be cut down.

In regard to keeping the labor better satisfied, I would like to quote from the president of a mining operation with whom I talked the other day. This man said: "Roller bearings on mine cars are going to do more to keep the diggers contented than anything else. I have noticed that roller-bearing cars push so easy that the men will stick to their work longer and do it more willingly with the easier running cars." Few things drive men more quickly from a mine than cars that a man cannot budge. Stiff cars, wherever they are found, form a leading item in the diggers' long list of complaints.

The Labor Situation

General Labor Review

The only new disturbing element of importance in the country generally is in the Greensburg district. It is there said to be due to the energy of hyphenated citizens, but one cannot be clear as to that point. The men asked for eight hours and mine-run measurement, and got both, but struck anyhow. How often that has occurred even where hyphenism could not be alleged! Men always have some unsatisfied desires, and when they get some of them the others look more attainable than ever, and they ask for these also—"even as you or I." These men had no union recognition and no check-off, and they still coveted these things, which was not unreasonable, seeing that there are men a-plenty who have coveted them before.

The H. C. Frick Coke Co. has granted its men the 8-hour day. It is to be expected that the Connellsville region will follow suit, as the district always follows closely the precedents set by the H. C. Frick Coke Co., which is the largest coke producer in the region.

The news from Kentucky is not important. The Kentucky National Guard has been ordered out. The tonnage in the west Kentucky region has not been much changed by the strike. There is some trouble in West Virginia in the New River district. However, the difficulties are local; at Raleigh the men want a place to hold union meetings and at Dunloop they are dissatisfied with the contract physician.

Anthracite Board Pledges Output

The Anthracite Conciliation Board, on which the operators and mine workers are equally represented, declared on July 13, at the invitation of the Coal Production Committee of the Council of National Defense, that the hard-coal region would put out the maximum production of which it was capable. The operator members of the board are S. D. Warriner, of Philadelphia, president of the Lehigh Coal and Navigation Co.; W. J. Richards, of Pottsville, president of the Philadelphia & Reading Coal and Iron Co., and W. B. Connell, of Scranton, president of the Connell coal interests. The mine workers' representatives are the three district presidents of the union—T. Kennedy, of Hazleton; J. Dempsey, of Scranton, and J. Matthews, of Shenandoah.

The interests of the operators and of the mine workers are identical with those of the public. A small output of coal, so long as there is a set price for the product and a set wage, must hurt both parties. Both stand to gain by a large tonnage and both are determined to see that the output shall reach a hitherto unequaled figure.

Strikes Occur in Greensburg Field

The Greensburg, Penn., field has hitherto been nonunion, and until recently it appeared as if it would always continue to work without the surveillance of the United Mine Workers' organization. But the war, which has upset so many calculations, has changed conditions around Greensburg also. The Austrians, who were docile mine workers before the war, are trouble makers now.

They want to join unions and strike, but as they are indifferent to the conditions granted and wages paid, and stir up trouble simply because trouble helps Germany, there is little advantage in giving them what they ask for. In any event they will strike and make trouble. So they are by no means ideal union men. Their very zeal for disorder makes concession to their demands foolishness.

Of ccurse, the companies may discharge all these wilfull men. No one would care much if they did, and most people would applaud their action; but then it would be hard to get others until the mines were run on a union basis; so, after all, the Austrians may be helping the union indirectly.

The International organizers find in this anti-American element—about 85 per cent. of the workers are foreigners—a better chance for their schemes than they enjoyed in Somerset County, and they are doing their very best to complete their organization in the Greensburg field. The organizers did not intend to call a strike till the work of unionizing the workers was completed. But the miners wanted to quit work and make trouble more than they wanted to join the union. As a result they did not wait till the work of enlisting men in the union ranks was complete, but went on strike as fast as they thought strikes could be organized.

On Monday, July 9, the mine of the Youghiogheny & Ohio Coal Co., which, as has been noticed in former issues, had been on strike for several weeks to secure the recognition of the union, returned to work under some sort of an understanding with the organizers. But it was all a mistake as far as the pro-Germans were concerned. They regarded any settlement, no matter how liberal, as undesirable; so the men came out in the latter part of the week.

On the day on which the Youghiogheny & Ohio plant returned to work the Penn slope of the Penn Gas Coal Co. struck for a checkweighman, the check-off and the mine-run system of weighing coal. The mine returned to work in the latter part of the week, the only concession made being the establishment of the mine-run method of measuring each man's output. All the operators granted this as the men seemed to desire it.

On the same day that the Penn slope mine workers struck the Austrian element at Edna managed to bring out the men at Edna No. 2, a mine of the Pittsburgh & Baltimore Coal Co., a subsidiary of the United Coal Corporation.

These men seemed to have no real grievance. Some were dissatisfied, however, with a checkweighman that the men had elected, and a few wanted mine-run measurement. They called in the union organizers and asked them to unionize the working force. On the next day they returned to work without having made any demands.

On Monday night, July 9, the employees of the Keystone Coal and Coke Co. met, and on the next day struck, demanding mine-run measurement, a checkweighman, the check-off and recognition. These men were still out on July 14.

Most of the men at the Yukon mine of the Westmoreland Coal Co., which adjoins the Youghiogheny & Ohio Coal Co.'s mine, ceased work on Friday, July 13. The next day the Claridge mine also was reported on strike.

After meetings held every night during the week at either the Herminie or at mines Nos. 1 and 2 of the Ocean Coal Co., about 300 men of the first-mentioned plant quit work on Friday, July 13. On the next day a meeting was held at Herminie and the Austrians at No. 2 mine of the Ocean Coal Co., composing about half the men, came out on strike, the men at No. 1 mine taking the same step.

The representatives in Pittsburgh of the Department of Justice are investigating the situation in this field. So far there has been no violence, but in order to be on the safe side the sheriff, John Kilgour, has closed 11 saloon bars near the Herminie and Yukon operations.

Eight foreigners were arrested on July 14 as alien enemies. They were lodged in the Westmoreland County jail by Sergeant T. J. McLaughlin, of Troop A, State Constabulary.

An unfortunate feature is the fact that 1000 miners out of the 3000 idle are Austrians. These men are all disposed to give trouble, and yet they are not alien enemies.

Injustice of the Short Working Day

Eastern Ohio miners have called in John Moore, the president of the Ohio district union, to try and remedy the injustice of the short working day, which injures both the mine workers and the company, but the former more seriously than the latter.

According to the mine workers at Gaylord colliery of the Pittsburg & Cleveland Coal Co., it takes 24 railroad cars to round out a full day for the mine workers. The railroad company is placing only six and the men are asked to work a fourth of day, two beggarly hours. Now it is bad enough to dress and plod to work and back again and wash and dress again for such a piece of work, but it is worse yet if, as with many of these men, it costs a dime each way for carfare and the waste of some hours for travel. About 40 per cent. of what they make they have to hand over to the traction company.

The companies want cars placed every other day so that they can run at least a half-day. The mine workers feel that given alternate day's work—even only alternate half-day's work—they can manage to live, for on alternate days they can put in a full day's work on the farm or on the roads.

And now let the Indiana miners mark this: John Moore is not organizing a strike. He knows that the coal operators are not to blame any more than the miners. The railroads are at fault and John Moore realizes that fact, and he is bringing pressure to bear on the State Utilities Commission. That is the right place. The railroad company would not care if the Gaylord colliery were closed for a month. It could get all the coal it had equipment for at other mines. A strike could only serve to give publicity to the complaint, and publicity can be secured in other ways.

In Indiana 500 mine workers employed at the Indian Creek mines have to depend on the railroad commuting service. Recently the guides of the mine cage broke and the mine was closed down. The company notified the railroad to send the train to take the miners home, but the railroad officials declared that the train ran on schedule, and if the men wanted to come home on it they must wait till the proper time. The miners objected to taking that 5-mile hike in their warm mine clothes in the full midday glare of the midsummer sun.

It is useless to deny that the railroad had some justification. Once break a schedule, and no one knows where you will land. Moreover, where railroads go to two mines with one train, two trips will be necessary and the commuting-service profit will go utterly by the board. Then, also, special trains muddle the whole scheme of things, and it might well be that the crew who pulled the train would be entitled to extra pay.

The mine workers only pay $1.50 a head per month for the service rendered. They have struck to get their demands, thereby penalizing the company, which is not to blame, and breaking their contract. They are morally in a bad position—asking a railroad to break a contract in their behalf and breaking a contract at the same time to their employing company's disadvantage.

Refuse To Work in Unsafe (?) Mine

An explosion occurred in the Lafferty mine of the Pittsburgh-Belmont Coal Co., near Bridgeport, Ohio, in what is known as the eastern Ohio, Belmont, or No. 8 Vein district of the state. Four mine workers were injured. The accident was ascribed to their carelessness. Four of the Ohio State mine inspectors examined the mine and declared it safe, but the mine workers were not satisfied and refused to return to work. L. D. Devore, of Columbus, one of the inspection force of the state, finally succeeded in satisfying the men and they returned to work after 11 days of idleness. About 400 men were idle. It appears that the mine workers believe the explosion was due to gas and that precautions should be taken against it. The inspectors deny that gas is being generated and say that the mine workers in tearing down a brattice dislodged dust which exploded with the results noted. The union officials supported the state officials in recommending a resumption of work.

Lubrication of Mine Cars

To keep mine cars in continuous operation is one of the serious problems that confront the mining superintendent today. Too frequent breakdowns handicap production. Constant scrapping of wheels and axles increases costs. Both are evils to be avoided.

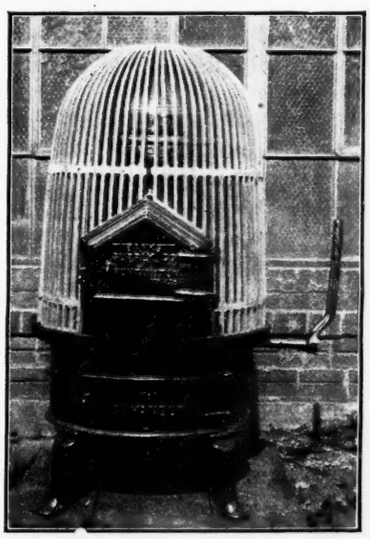
To keep car wheels lubricated for months on a single oiling—to insure a low lubricant cost and a lower labor expense—is the purpose for which Nonfluid mine car oil was designed and for which it was perfected through prolonged experimentation and severe working tests.

When car wheels are supplied with this oil considerably less power is required to move them. At the same time the lubricant decreases the wear on the frictional surface, prolongs the life of the wheels and reduces the cost of repairs and replacements. It maintains a uniform consistency at all temperatures and is therefore thoroughly reliable as well as economical. It does not liquefy in summer or congeal in cold weather. The oil enables cars to run from 3 to 6 months and even longer, on one application. It is not affected by contact with water, hence the water in wet mines will not flush it out of the wheels.

Since this product possesses great natural durability, its use eliminates to a large degree the waste of lubricant caused by the leakage of ordinary oil and grease from the bearings. Nonfluid mine car oil can be applied quickly and economically with an ordinary grease gun, and wheels once packed with it require no further attention for many months.

Economical Sand-Drying Stove

The heavy grades in and about collieries, in connection with the natural dampness of mines, make dry sand a necessity whenever steam or electric locomotives are used for motive power. Perhaps the most satisfactory, economical and most easily managed outfit for this purpose is a sand-drying stove such as is in general use by the principal steam railroads and trolley lines throughout the country. This dryer can be used plain, but if surrounded with external gratings, to keep the wet sand from impinging on the hot castings, the life of the dryer is greatly prolonged and its capacity almost doubled. Moreover, a saving of fuel is obtained. The height of the stove varies from 48 to 58 in. and the capacity from 7½ to 18½ cu.ft. of sand. The stove here shown is manufactured by the Indiana Foundry Co., of Indiana, Penn., and the list prices vary from $40 to $95.



SAND DRYER WITH GRATING

Editorials

More Equipment Articles Next Week

IN THESE times when everyone's thoughts are turned to war; when each company and each individual is striving to produce the maximum, it is not easy to get competent mining men to write descriptive articles. However, the wide range of subjects covered in *Coal Age* this week speaks well for the interest of those comprising the coal fraternity. Much benefit is sure to come from the information here given.

The supply of articles submitted to us dealing with coal-mining equipment far exceeded our expectations. For this reason, we have endeavored to run in this issue the articles that came to us first. Some of the best discussions, therefore, are held over for next week. As a consequence, we will have in reality two equipment issues instead of one.

Among the articles that will appear in our next issue will be: "Electricity in Mining"; "A New Box-Car Loader"; "An Automatic Safety Mine-Car Cager"; "The Motor Generator in Mining"; "Steel Lockers for Wash Houses"; "Steam Turbines at Coal Plants"; "Reducing Costs of Coal Loading," and a number of other articles just as interesting, all of which goes to insure that the coming number of *Coal Age* will be quite as valuable in every way as this week's special issue.

We thank our friends for their helpful coöperation.

The I. W. W.'s

THIS nation is reaching a point where it had best pause and consider. Socialism is our chief problem. Australia is an example worthy our notice. Most men who have investments there would be glad to get their principal back and get out. Fresh capital is becoming more and more timid when Australia is mentioned. The growth of the country is stunted.

New Zealand is under socialism. Here is another lesson. The radical leaders of small factions have, on assuming responsibility, become the conservative leaders of great parties. In other words, New Zealand socialists have discovered that theory and practice are somewhat different; that demands can be made which cannot be met; that property has rights as well as labor, and that a government built in defiance of this latter truth cannot exist for long.

The "I. W. W.'s" are a body of socialists gone mad; a mob operating in the name of justice to disguise their destructive and criminal aims; an organization that levels ability, puts a premium on incompetence and attacks the foundation of all civilization.

The leaders of this anarchistic party have reached out to throttle the metal mines. They have quietly, unexpectedly, and to a certain extent effectively organized a certain class of foreign miners. In most districts their membership is alien. In certain localities it is more than 50 per cent. composed of men who are still citizens of the central empires with which we are at war.

In Arizona at a number of points the recent registration showed that 80 per cent. of the miners were foreigners who had not applied for citizenship. These men are the trouble-makers; the better class of union miners have proved themselves loyal by helping drive these aliens out.

The I. W. W. demands $6 for 6 hours' work—one dollar an hour. On drills that have been operated by one man paid $6.15 for 8 hours' work, they demand two men at $6 each for 6-hour shifts. Imagine what would happen to mines working four shifts a day at a rate of $1 per hour per man.

Down in Australia, on the street corners, they are preaching the doctrine that two hours a day is a sufficient period of labor for all of us. Where is the end? What is the use of temporizing with such insanity that knows no bounds?

The metal men didn't know their workmen had been lined up for anarchism. What assurance have we that such agencies are not active in our coal mines?

The time to beware is now. There is a decent element in every camp that should stand together for the enforcement of law and order.

Loaders and Car Shortage

NEED for the installation of more box-car loaders at coal mines throughout the country is demonstrated clearly by an investigation just completed by the United States Geological Survey. Inquiries were sent to all bituminous mines and practically complete returns have been received. These show that only slightly over 300 loaders are being operated throughout the entire country.

One of the important factors of the present car shortage is that coal cars are employed for other uses. A photograph recently circulated to illustrate the difficulties surrounding automobile shipments depicts the unloading of automobiles from a hopper-bottom coal car. This is an example of the many uses to which such cars are being put. In the aggregate, the movement of coal is cut down many thousands of tons by such practices. While the railroads are attempting to confine coal-carrying equipment to that use as much as possible, it is not probable that they will haul coal cars back to the mines empty when loading in that direction, with other commodities, is obtainable.

Francis S. Peabody, the chairman of the Committee on Coal Production, is strongly in favor of the increased use of box-cars when coal cars are not available. If

more mines were equipped with box-car loaders, it not only would enable the operator to move his output more promptly but would tend to car economy, since it is now generally necessary to move as many box-cars away from mining districts as empties.

Owing to the fact that there are no box-car loaders at many of the mines in the Pocahontas and New River districts, it has been found advisable to transfer from coal cars to box-cars at Portsmouth, Ohio, a considerable portion of the navy coal moving overland to San Francisco. Since this movement averages 100 cars a week, considerable extra labor and expense are entailed.

While there are some box-car loaders in practically every coal-producing district, by far the greatest number are in operation in Illinois and Colorado. It is regarded as probable that the Committee on Coal Production will recommend in the near future that box-car loaders be installed wherever practicable.

Who Will Pick Up These Dollars?

IN A CERTAIN foreign country, every school child is taught about a king named Knut, who rebuked his courtiers for declaring that he could order the forces of nature so that the waves and the tides would obey him and so that the waters which lapped the shores of his kingdom would not wet his feet how near soever he would plant his throne to the margin of the sea.

This same King Knut knew that he did not make the laws of nature, and every high-school child knows also that he *could* not do so. But there are some presidents who today are not so clear as to whether laws, especially economic laws such as that relating to supply and demand, may not be successfully suspended in a free market by a mere dictum of authority relative to a few arbitrarily selected articles.

The price of a commodity in an emergency is determined by its value. Where? At the market. It does not matter what it costs at the mill or the mine. The significant thing is its scarcity at the point of distribution—and there only.

It might be well to define what is meant here by that expression "point of distribution." The price of an article which enters into the manufacture of another article is paid by the public as part of the other article, and the first article is really not finally distributed until the public buys the second article. So the real market of the first product is where the second and subsidiary product is sold.

Let us take an example to show the importance of the cost at the point of distribution. The foreigner buys something of American manufacture. To him it is an American article plus transportation plus the profit of the shipper, retailer and other middlemen. Nevertheless its price is a single item fixed solely by supply and demand *where the goods are bought.* It doesn't depend on cost of production or cost of transportation, but on the scarcity in the market.

Reduce the cost of the article in America, and the two other items may be increased if the demand is sufficiently large abroad to keep the total price unchanged. Then, if you lower the transportation charge, the profit to the shipper, retailer and other middlemen will rise if the conditions of supply and demand of the delivered article stil remain unmodified.

These shippers, retailers and middlemen are quite likely to be foreigners, and they profit when the price charged by the manufacturer declines and when the shipping concerns forego their profit. So the foreign public is not appreciably benefited. The readjustment is only helpful to the foreign middleman.

The same is true with the price of coal. The operator sells coal to a knitting mill. The price of knitted goods is temporarily regulated by the supply and demand *in the market* rather than by the cost of production at which the supply can be augmented and the demand ultimately satisfied.

If the operator lowers the price of his coal, the manufacturer increases his dividends. He collects what the mine owner might have collected.

It is clear that if you are expecting to regulate basal industries, you must regulate secondary industries also. Either supply and demand is wrong everywhere or it is wrong nowhere. The coal man has been supplying coal at an exorbitant price to the shipping trade. Yet we learn that freights even on the Pacific Ocean have risen 700 per cent.

Now the coal man has agreed to reform, and the transportation interests will reap the advantage. If the men who own the shipping are also curbed, and transportation still remains scarce, as indeed it will for a long time, the middleman will profit. So all the advantage of our virtuous forbearance will go to build up the fortunes of some foreign millionaires. Surely there is no need to stimulate the middlemen, native or foreign. We have too many of them already.

An example of the truth, that supply and demand fix a price and that the items are made to suit, is seen in the coal industry. The price of coal delivered at Newport News was recently $8.50 per ton and so at $8.50 the coal was sold. Contracts put the producer's share at $1.35; the Interstate Commerce Commission put the freight at $1.45, and economic law dedicated what was left to the jobber. If he hadn't taken it, it would have gone to the shipping concerns or the men jobbing the things shipped and so on. Someone would have filled the gap. After awhile the coal men did it, and the jobber was angry. Now both are to be restrained and someone else is to get it, for it will be gotten. Dollar bills are always picked up when they are left lying around. Somebody is sure to appropriate them.

After all, Knut might have gone dry-shod had he managed to regulate the sun and moon, and our modern Knut may succeed in his quixotic enterprise if he will regulate the profits of *all* domestic industries and the prices of all the goods we sell in foreign markets. But he is only just beginning to regulate prices in this country. He has had nothing yet to say about cotton, which has also shown soaring tendencies. He does ill to select favored industries when seeking regulation.

Discussion by Readers

Mine Lamps

Letter No. 7—The recent discussion in *Coal Age* regarding mine lamps of different types and makes has attracted wide attention and cannot but prove of great interest and value to the mining world, both coal and mineral.

The article entitled "Dangers Accompanying the Use of Carbide" by J. R. Allardyce, *Coal Age*, June 30, p. 1108, described a number of conditions, under which carbide is handled in mines, that would be considered dangerous by anyone who has given the matter much thought. The article gives a timely warning that should be heeded by all users of the carbide lamp.

As Mr. Allardyce suggests, the average miner is wholly ignorant of the nature of the chemical reactions that are possible when carbide is carelessly handled. The article is written not for the purpose of unduly alarming those who use the carbide lamp or with the idea of discouraging its use, but for the sole purpose of acquainting miners with the danger that results from the careless handling of carbide.

In strong contrast with these disqualifying features of carbide, for use in mines, the advantages of the electric mine lamp are made more prominent. The portable electric cap lamp, now so widely used in mining, possesses all of the advantages and none of the unfavorable features of the carbide lamp, to which attention has been drawn in the article mentioned. I hope to see the discussion continued, as there are few of greater importance in coal mining. ELECTRO.

Pittsburgh, Penn.

Carbide vs. Oil Lamps in Mines

Letter No. 2—The discussion of mine lamps in *Coal Age* has succeeded in exposing all sides of the question to view. As the old saying puts it, "It is the small things that count," and this discussion has shown that a good light is one of the important factors in increasing the efficiency of the miner.

Some months ago, I worked in a mine where carbide lamps were used exclusively. One evening, a Government man who was paying a visit to the mine stood at the shaft head watching the men as they came up. The superintendent was with him, and some remark was made referring to the lamps. The Government man asked the superintendent if he had observed any difference in the amount of coal a man could load when using a carbide lamp, as compared with the amount loaded by the light of an oil lamp. Without any hesitation, the superintendent replied, "Twenty per cent. in favor of the carbide lamp."

While this estimate of the superintendent may be a little high, the opinion prevails very generally among those who have used this lamp that the carbide light far exceeds that given by any oil lamp. The objection so often urged against the use of the carbide lamp that it is "unsafe for use in blackdamp," is hardly more than a mere fancy, I imagine. I know of numerous instances where a carbide lamp has been extinguished in an atmosphere where the men continued to work [presumably with electric lamps] for several hours afterward, and attempts to keep a carbide light in the place failed continually.

It is not my intention to claim that a carbide lamp is safe for use in all conditions of mining. In the presence of gas its use would be as dangerous as that of any other open light. I do believe, however, that a man working with a carbide lamp has plenty of time to withdraw from a place when his lamp refuses to burn and there is not the danger of his being overcome with the gas, as many seem to think.

While there are men who condemn one or another make of this lamp, there are few practical mining men who will not agree that the carbide light possesses a great advantage over that afforded by any oil lamp. As the advertiser puts it, "It is like taking sunshine into the mine with you." Carbide and water in a well-designed lamp give more light for the money than can be obtained from oil.

OBJECTIONS TO CARBIDE ANALYZED

Permit me to refer briefly to the so-called objections to which W. H. Noone has drawn attention in his letter, *Coal Age*, June 2, p. 966. I agree with Mr. Noone when he says that men who will offer such objections to a good light should not have any light, but should be made to work in the dark.

1. Referring to the time required to keep a carbide lamp in order, compare this with the time consumed in putting in a new wicking in an oil lamp, only to find that it is either too tight, so that the light will not burn, or loose, so that it drops oil.

2. Regarding the cost, the price of a good carbide lamp is $1, and the lamp will last from two to three years with proper care. I have used my present lamp more than two years, and it is good yet and gives me no trouble.

3. When a man understands how to regulate the supply of water to the carbide, so that the latter is wholly consumed, the residuum, calcium hydroxide, $Ca(OH)_2$, gives off no disagreeable odor when emptied from the lamp. The odor is observed when this residuum is partly unconsumed.

4. A man who will get out of water or carbide would prove equally careless and find himself out of oil when using an oil lamp.

5. I have been using a carbide lamp for several years past, and I am not conscious of any injury to my own eyesight.

6. No one claims that the carbide lamp is a "safety lamp" or that it should be used in the presence of gas where all open lights are dangerous.

To an unprejudiced mind any of these objections are easily overcome and are scarcely worthy of recognition. The practical test is that men who have become accustomed to the carbide lamp will not voluntarily go back to the use of the old oil lamp with its soot, smoke and grease. The general verdict of these men is that the carbide lamp "has come to stay." Its use has made it possible to work places that could not be worked if oil lamps were burned, and where the smoke would stand in the places until the men were forced to quit work for better air. OSTEL BULLOCK.

Herrin, Ill.

Mine-Haulage Systems

Letter No. 2—In connection with the discussion of the mine-haulage proposition presented in the inquiry of "Operator," *Coal Age*, June 9, p. 1012, I want to suggest that the success of any haulage system depends chiefly on the following three factors: (1) The method of developing the property underground. (2) The adaptation of the system employed to the physical conditions existing in the seam. (3) The proper distribution of the miners working at the face. Permit me to refer briefly to these several factors.

1. When developing a field of coal where the full pitch of the seam exceeds 4 per cent. and is in favor of the loads, it will generally be found of advantage to drive the main haulage roads across the pitch, so as to reduce the grade and make the handling of the cars easier and safer. For example, if the full pitch of the seam is due north, drive the entries N 45 deg. E and N 45 deg. W. In this arrangement the room entries can be cut off at 1500 ft., which will not only expedite the work but concentrate the miners and reduce the expense of haulage, both in the use of material and the time required for hauling the coal.

2. The physical conditions in the seam, relating to the height of the coal, extent of territory, inclination of seam, presence of gas and similar conditions, will largely modify the system of haulage that should be employed. In addition to these factors there may be requirements of the miners' union that will make advisable the consideration of certain plans, in respect to moving the coal from the face to the tipple. These conditions should all be carefully regarded in the selection of a system of haulage.

DISTRIBUTION OF MINERS AN IMPORTANT FACTOR

3. In the operation of a mine a matter of much importance is the arranging of the working face so that there will be a sufficient number of miners placed in each room entry to provide enough coal to give the motor or rope a full trip without waiting, which would delay the work of gathering the cars in other sections of the mine. Where this matter is not given due consideration, it is impossible to maintain a uniform movement of coal from the working face to the tipple or the shaft or slope bottom and, as a consequence, much delay and great loss of time result in every part of the work.

Where the grades on the haulage roads do not exceed 3 per cent., I would recommend the use of electric locomotives. If the trolley system is employed, it will possess the advantage of permitting the trolley wire to be tapped at different points where it is desired to run coal-cutters, rock drills, an electric pump or a small electric hoist. In some districts it is the practice of miners to push their cars in and out of the rooms and, in that case, only one kind of haulage will be required.

Where it is necessary to haul the cars to and from the working face in the rooms, I would use the storage-battery locomotive for that purpose. In low seams it may be necessary to brush the roof over the roads in order to provide the necessary headroom and permit the locomotive to reach the face. In that case an electric locomotive using the trolley system could handle the cars from the inside parting to the mouth of mine or tipple, while a storage-battery locomotive could be used to gather the cars from the rooms and place them on the parting ready to be hauled out of the mine.

In working an inclined seam, where the coal is low and the roof rock hard and expensive to shoot, it may prove economical to drive rooms with double track and install a gravity-plane haulage for handling the cars from the face to the gangway level. By using a pulley block made fast to a post set at the head of each track and extending the rope attached to the two cars across the face, it is possible to have the descending loaded car pull up the ascending empty, the process being repeated alternately on each side of the room. The adoption of a suitable method, however, will be determined by the judgment of the management, after carefully considering the conditions as they exist in the mine.

Ohio Pyle, Penn. W. R. JONES.

Mixed Haulage in Mines

Letter No. 2—The letter of "D. L. C.," *Coal Age*, July 14, p. 69, advocating mixed haulage in mines under certain conditions, refers to the previous letters of Joseph Virgin and "Ohio Foreman," Vol. 10, pp. 553 and 937 respectively, as supporting the same view in regard to mine haulage.

Being interested in looking up these letters I noticed that the last-named writer believes with the one first mentioned that "a mixed-haulage system will produce coal cheaper than an absolute mechanical haulage." In seeming contradiction of this opinion, he then goes on to show that, because of a rapid decrease of output due to adverse conditions in hauling with mules on grades where it became necessary to use a "block and tackle," it was decided to install gathering motors, which was done until "we were working four locomotives and six or seven mules."

Comparing the results in amount of coal hauled by the same number of men, he finds that there was an increase of from 5 to 7 per cent. in favor of locomotive haulage. It would appear, however, that the comparison made is hardly a fair one, judging from his description of the conditions. He states that the work was arranged so that the mule always had a short haul and the locomotive took up the burden where the conditions made it impracticable to haul with mules.

Commenting on the situation, I feel sure that if "Ohio Foreman" will consider a moment, he will agree with me that an increase of from 5 to 7 per cent. represents a small margin in comparing the costs of two methods of hauling coal.

The only conditions that I consider would make mule haulage more economical than a proper kind of mechan-

ical haulage are a level floor, a size of car that can be handled easily by one mule, a short gathering haul and an arrangement of rooms such that, after hauling an empty car to the face of one room, the mule could pass through a crosscut to the face of an adjoining room and pull out a loaded car, thereby saving a double trip to the face of the room for that purpose. Under these conditions, I admit that a mule would be hard to beat, but they are rarely found in a single mine.

In my opinion, the advantages to be derived from mechanical haulage, in the average coal mine, will far exceed 5 or 7 per cent. Let me add that, in the change from mule to locomotive haulage, the extra cost for wiring can be wholly avoided by the use of an electric storage-battery locomotive. This type of machine requires neither trolley wire nor rail bonding.

Ironton, Ohio. G. E. ALLOWAY.

Uncertificated Mine Foremen

Letter No. 3—The inquiry by "Kentucky," asking to what extent the safety of a mine should be risked by reason of war conditions, *Coal Age*, June 2, p. 970, reminds me of an incident that happened a few years ago in a mine where I was employed.

In that instance a miner was caught and killed by a fall of slate in his room. When he was discovered a little later by one of the assistant foremen, a driver was dispatched to notify the foreman of the accident. Jumping on the rear end of another driver's trip in order to hasten his errand, he was asked by the other driver to set the brakes and replied, "To h— with the brakes, there is a man dead back there."

This response would seem to indicate that the fact of a man having been killed was reason sufficient to ignore every precaution—kill a mule, perhaps a man—in a reckless attempt to hasten the giving of his message. Similarly, the inquiry to which I have referred would seem to consider the advisability of setting aside the precautions established for the safe operation of mines, and get coal at all hazards to supply the demands brought about by the war. It would seem to mean, "Get the nearest coal at hand, risk caving the mine or killing men, but put out the coal regardless of all else—and this, because a state of war exists."

NEED OF SAFETY PRECAUTIONS MORE URGENT NOW THAN EVER BEFORE

Let me say that there should be more effort put forth for the protection of mines and miners, at the present time, than ever before. Because of the increasing demand for coal, our mines should be developed with regard to the highest efficiency in the work and a maximum recovery of the coal in the field. Because of the growing shortage of miners, the men working in the mines should be given the greater protection, which is the sane thing to do. A little calm reflection will convince one that it would be foolhardy to risk the lives of mine workers when men are being killed in such numbers on the battlefield.

Someone has advanced the argument that a practical miner is better suited to take charge of a mine as foreman than many certified men. This is true with regard to men who got their certificates on the strength of their book knowledge alone. Such men are more fit to hold a plow handle than they are to manage a mine. The majority of our mine foremen, however, I am proud to say, are men who combine practical experience and theoretical knowledge secured by close application to their work and their books.

Experience in the operation of mines shows that it is absolutely necessary that a successful mine foreman shall have some education. If this is true, I can see no reason why a man without the education that would enable him to secure a certificate should be placed in charge of a mine and made responsible for its safe operation.

THE TEST OF A MAN'S CAPABILITY

If a practical miner asked me for a position as mine foreman and told me that he considered himself "just as capable as a man holding a certificate," I would ask him why he did not take the examination and prove his capability. I would ask him enough questions about the management of mines, before he left me, to convince him that he needed something more than practical experience to fit him for the position of mine foreman.

In closing, permit me to say that writers who claim that practical men are better qualified for the position of mine foreman than many certified men must show the grounds for their conclusion. The mere statement of this belief does not prove it a fact. It is to be hoped that no operator or superintendent will be led to make the blunder of placing in charge of his mine a man who cannot prove his competency for that position along with other men, in the coming crisis.

Ohio Pyle, Penn. W. R. JONES.

Extinguishing Fire in a Gassy Mine

Letter No. 3—The question of extinguishing a fire in a gassy mine is one of the most important with which a mine foreman has to contend, as it entails the most dangerous conditions. Courage and cool, deliberate judgment, together with prompt and decisive action, are required to overcome the danger that may threaten the entire mine.

Regarding the case presented in the inquiry of "Fireboss," *Coal Age*, June 9, p. 1012, my first consideration would be to prevent the gas-charged air, circulating along the face of the first eight rooms on the intake entry said to be generating gas, from reaching the fire at the head of the entry. Different methods of accomplishing this suggest themselves, but the most feasible one, to my mind, is to change the direction of the current in these rooms by erecting a temporary canvas brattice on the entry, just inby from the mouth of No. 8 room. Having done this, it will be well to make a small opening in the stopping opposite the mouth of this room, which will permit a little air to circulate through the entry and through the rooms while the remainder of the necessary work is being performed.

The next step is to construct a box or canvas brattice at the mouth of No. 1 room that will overcast the air coming from the rooms and conduct it directly into the return airway. Such an overcast is quickly built by bratticing off the mouth of No. 1 room to within 18 or 20 in. of the roof and carrying the canvas across the entry to the stopping in the crosscut about opposite the mouth of this room. An opening is made in this

stopping close to the roof so as to permit the air to reach the return airway.

The work on this overcast being completed, proceed at once to close the small opening made in the stopping opposite the mouth of No. 8 room. This will cause the intake current passing up the entry to enter No. 8 room. The circulation at the face of these rooms will thus be reversed, and the gas generated in the rooms will be conducted back and pass out of the mine by the return airway, without reaching the fire.

While this work has been going on, every effort should be made to extinguish or, at least, prevent the spread of the fire. Only sufficient air should be permitted to pass through the canvas brattice inby of No. 8 room to enable the men to approach the fire and take means to extinguish it.

Permit me to refer here to two fires, in my own experience. Both of these occurred on idle days and had gained considerable headway when discovered, but both were successfully handled and extinguished without the necessity of sealing them off or closing the mine.

Fighting a Mine Fire on an Idle Day

In the first instance a gas feeder had been ignited by a shot and burned in the coal about 4 hours before it was discovered by some engineers who were making a survey of the mine. They hastened to notify me at the office, some two miles away, where I was paying off the men.

The mine foreman and all the firebosses were away for a day, but I organized a crew to help me and, hastening to the mine, started a hunt for the water box, which we filled with water and rushed to the fire. We found the coal burning like a fiery furnace at the head of the face heading. There were three butt headings turned to the right and three to the left of this face heading, and brattice had been carried up to near the face of each of these headings to keep them clear of gas.

My experience in this fire taught me the importance of securing the roof against a fall, as far as possible. In this instance the heat of the fire caused the roof to fall around the timbers holding the brattice, which fell over against the rib and formed an air passage that conducted air to the fire and fanned the flames. However, by using compressed air, of which we had plenty, we were able to approach and managed to drench the burning coal and to load out six cars, much of which has been coked by the fire.

Another Fire Extinguished in a Similar Manner

The second fire occurred in the same mine about 400 ft. from the foot of the air shaft, near Nos. 1 and 2 butt entries, with fourteen rooms turned. It was an idle day, and only one man had been in the mine repairing a door. As before, I was paying off the men at the office when some carpenters, whom I had working on some houses and who were returning home at the time, discovered smoke issuing from the air shaft and hastened to notify me. The foreman had asked for a week off and, again, I was alone with a few men to fight the fire.

I want to say, here, that it is more difficult to get volunteers to fight a fire that is seen than one that is hidden from view. However, I succeeded in getting three or four men and, hurrying to the mine, we found the door that had been repaired was already burned down, which short-circuited the air in the butts and, to that extent, eliminated the danger from the gas generated in the rooms.

We had no difficulty in organizing a bucket brigade and succeeded in extinguishing the flames that had already ignited the fine coal and was burning fiercely. In closing, let me say that it is of the greatest advantage, in such cases, to have a good sprinkling system or pipe line provided that will furnish abundance of water for fighting any fire that may occur.

West Leisenring, Penn. R. W. Lightburn.

Back to the Mines

Letter No. 6—I was glad to read the letter of W. H. Noone, *Coal Age*, June 23, p. 1088, in which he describes the love of home as the great factor that will hold men at the mines. Mr. Noone is to be complimented on his references to the beautifying of the home and its surroundings, which, it cannot be denied, exerts a strong influence in making a satisfied class of miners.

After all has been said, however, it must be acknowledged that few men who have worked any great length of time in the mines will be satisfied to engage in another occupation as a means of earning their living. While many miners become dissatisfied and leave the mines for a time, they are almost sure to return at the first opportunity. They are like people who have never lived in the city but are lured there by its attractions. The majority of these soon weary of city life and return to their old habits of living. In the same way the miner is not satisfied until he has found his way back to the mines.

Experience Is a Good Teacher

Miners who have given up their homes and moved to other locations in search of different work always come back wiser than they went. Each has his home to make again, but the lesson taught is one that will long be remembered. The man, having learned his lesson, makes a better miner—finds less fault with his work and surroundings and is not so ready to quit because of a little misunderstanding with his boss or his buddy. He realizes that the "good jobs" he used to think were waiting for him are not so easily found. He is a better man, a better father and a better husband.

In every home the woman exerts a great influence over the man. The woman is the great homemaker, and it is her influence that keeps the man in his place when conditions in the mine are not the best. The beautifying of the home and its surroundings is the work of every true woman.

On the other hand, the company can do much to improve the advantages and attractiveness of a mining camp and make it desirable for the homelover, who does not care to have his wife carry water from a central pump, or be compelled to carry home groceries ordered at the company store, or wade through mud and water instead of walking on a paved walk. It is gratifying to see that many operators are considering the business side of improvements that will draw to their camp

a better class of miners and hold them when work is slack at the mine.

I recall a mining town in West Virginia that is yet, I believe, a type of the old idea of a coal mine and its surroundings. The company was operating a good seam of coal and, though the miners made good money, they were principally of that floating element who remain only long enough to get a few dollars ahead when they again "hit the trail." The company failed to realize that its loss, owing to these conditions, far exceeded what it would have taken to make the surroundings more attractive and bring to the mines a better and more permanent class of workers.

In my opinion this is a question that will continue to receive more and more attention in the near future, owing to the growing scarcity of good labor in the mines. In order to overcome the tendency of miners to seek other occupations, mining camps and towns must be made attractive and afford every advantage in the way of homes, schools, churches and places of amusement and recreation. It must be remembered that miners are human and learn to appreciate efforts put forth in their behalf, notwithstanding that the contrary is often urged. OSCAR.

Herrin, Ill.

Preventing Mine Accidents

Letter No. 8—In addition to the many interesting letters written with a view to preventing mine accidents, kindly permit me to outline some of the more essential elements that make for safety in mines.

First, it is of chief importance to secure the services of a superintendent and mine foreman who are each possessed of a practical and theoretical knowledge of mining in all its phases and who are thoroughly acquainted with the coal field in which they are operating. They must be men of integrity, sober and honest, and have executive ability that will enable them to maintain discipline and manage every operation in the mine.

The superintendent should be a man of superior qualities that will enable him to overcome any difficulties that may arise and advise his foreman as to the best methods to pursue. The mine foreman should devote his entire time to the inspection and oversight of all work performed in the mine, giving special attention to the reports of the fireboss and observing the evidence of his daily examination of each working place. He must take notice of any violations of rules and administer the proper penalties, to avoid, if possible, their repetition. The mine foreman must endeavor to foresee and avert any possible danger.

Daily Inspection the Best Safeguard

The avoidance of underground accidents, including those occurring in the shaft, will be greatly promoted by the daily inspection of all safety appliances, such as safety gates at the head of the shaft or safety blocks at the head of a slope, safety catches on cages, brakes on drums, hoisting ropes, couplings and headsheaves. The timbering of shafts, airways and working places must receive particular attention, also the safeguarding of all electrical installations.

The ventilation of the mine is the most important factor in its safe operation. A reversible fan should be employed capable of providing an ample volume of air, which should be conducted throughout the mine in separate air splits to enable the better control of the circulation. Where gas is generated, every precaution must be taken to prevent its accumulation at the working face or in abandoned or other void places.

The safety of a mine depends upon the care of each worker therein and, as no chain is stronger than its weakest link, the safety of a mine is measured by the acts of the most careless and reckless employee. For this reason, the most careful and thorough inspection of the workings must be made by the firebosses, who should be men thoroughly acquainted with mine gases and their behavior. A fireboss must be industrious, fearless of danger and conscientious in his work, and a total abstainer from drink. He must use a safety lamp of the most approved type.

Most Common Causes of Accidents in Mines

The most commonly occurring accidents in mines are those due to the fall of roof and coal. These can be prevented largely by greater vigilance in the inspection of the working places by mine officials and miners alike, looking for slips and faults in the roof and coal, and guarding against them. An ample supply of timber of the proper size and kind must be kept on hand at all times. Mine officials must instruct the men how to timber their places and see that the work is done promptly, withdrawing men from all places that are dangerous until they can be made safe.

The work of drawing timber must be performed by experienced miners who must use suitable appliances and proper precaution to make themselves safe while performing the work. Experience shows that 50 per cent. of the accidents from falls of roof and coal are due to the carelessness or indifference of the miner who is injured or killed thereby.

Accidents from the movement of cars can be greatly reduced by prohibiting anyone walking on roads where mechanical haulage is employed. If this is impracticable, sufficient clearance must be provided on one side of the road to enable men to pass the cars safely. Refuge holes should also be provided, at regular intervals apart, on all haulage roads where no rooms are turned off the road. A good clearance is particularly necessary where cars must be spragged or the driver must set brakes, on approaching a grade in the road. It is important to employ good trackmen whose duty it will be to keep the road in proper condition. Strict regulations must be enforced, preventing anyone from riding on loaded cars or using a slope or incline as a travelingway.

The reports of accidents that have occurred in the anthracite mines since Jan. 1, 1917, show that 69 per cent. of these have been due to falling roof and coal; 12 per cent. to firedamp and dust explosions; 11 per cent. to mine cars and 8 per cent. to miscellaneous causes. The reports also show that 70 per cent. of these accidents have resulted through carelessness on the part of the person injured. It would seem that mine foremen do not administer the penalties provided for such violation of the mine laws and mining rules as they should, or there would be a better showing in the reports of the district inspectors.

Kingston, Penn. FRED B. HICKS.

Inquiries of General Interest

Air-Lift Calculation

The shaft at our mine is 115 ft. deep. In order to handle the water that accumulates in the sump at the foot of this shaft, it is proposed to install an air lift that will be capable of handling, say 70 gal. of water per minute under a discharge head of 120 ft., which we estimate will require a 4-in. column pipe.

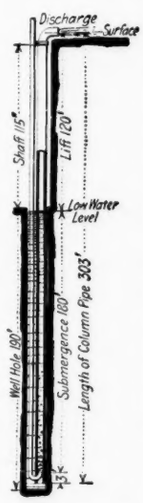
We are informed that it will be necessary to sink a drillhole in the bottom of the shaft to such a depth as will allow a sufficient submergence of the column pipe to enable the air lift to work successfully. I would like to ask to what depth this drillhole must be sunk; or, in other words, what submergence is necessary in this case.

Also, what volume of air and gage pressure will be required to deliver this quantity of water under the given head, and what size of compressor will it be necessary to employ? Kindly recommend a good make of compressor and state the horsepower required for its operation.

PAUL C. DOUGLASS.

Elizabeth, Penn.

The accompanying figure shows clearly the arrangement of the pipes. Since the depth of this shaft is 115 ft., it will be well to estimate on a lift of 120 ft. The "lift" is the vertical distance from the low-water level in the sump to the point of discharge at the surface. It is assumed, however, in this case, that the mine sump is of such size that the water level will not be materially lowered when the air is turned on, as is usually the case in a wellhole where the low water level will depend on the natural inflow being able to maintain the required discharge. If the required submergence is 60 per cent., the actual lift is the remaining 40 per cent. In other words, the depth of submergence[1] is estimated as 50 per cent. greater than the given lift. The latter being 120 ft., the depth of submergence here, is 180 ft., which makes the total length of column pipe 303 ft., allowing 3 ft. of extension below the air nozzle. The top of the column pipe is provided with an elbow for discharging the water into a trench or drain. Estimating on a velocity of about 100 ft. per min. shows that it will require a 4-in. pipe to carry a flow of 70 gal. per minute.



The successful operation of an air lift depends upon several important factors, which must be taken into consideration. Experience has shown that this means of draining water from a depth does not work successfully when the actual lift or head of discharge exceeds 225 ft. Up to this limit the scheme can be made to discharge a good volume of water when the following conditions are fulfilled:

(1) The column pipe should be vertical and have a submergence of at least 60 per cent. of its entire length. (2) The air must be conducted to the full depth of submergence and terminate in a nozzle that will spray the air into the water so that it will not tend to form large bubbles that would travel up one side of the pipe. (3) There should be a certain ratio of volume of air to volume of water, dependent on the height of lift.

The volume V (cu.ft. per min.) of free air required should be estimated by multiplying the quantity of water to be handled G (gal. per min.) by the lift h, in feet, and dividing the product by 125, which gives, in this case,

$$V = \frac{Gh}{125} = \frac{70 \times 120}{125} = 67.2 \; cu.ft. \; per \; min.$$

The working air pressure must be sufficient to overcome a head of water equal to the depth of submergence and is, in this case, $0.434 \times 180 = 78.12$ lb. per sq.in. To make allowance for friction, which is small, we will call the air pressure, here, 80 lb. per square inch.

The size of the compressor must be estimated from the required air volume, assuming the efficiency of the air cylinder is 85 per cent., which gives for the piston displacement, in this case, $67.2 \div 0.85 = 79.06$ cu.ft. per min. The speed of an air compressor, according to its size, may vary from 90 to 175 r.p.m. Assuming, in this case, that the compressor makes, say 300 strokes per minute, and taking the ratio of length of stroke to diameter of cylinder as $l/d = 1.25$, the diameter of the cylinder is found as follows:

$$d = \sqrt[3]{\frac{1728 \times 79.06}{0.7854 \times 1.25 \times 300}} = say \; 8 \; in.$$

The length of stroke is then $1.25 \times 8 = 10$ in., and the required size of compressor is therefore, 8×10 in.

For a speed of 300 r.p.m., assuming the efficiency of the engine driving the compressor to be 70 per cent., the horsepower required is calculated from the mean effective pressure in the air cylinder, which is found to be 36.12 lb. per sq.in., to produce an air gage pressure of 80 lb. per sq.in. at an elevation of 750 ft. above sea level, as at Elizabeth, Penn. The area of the piston of the air cylinder is $0.7854 \times 8^2 = 50.26$ sq.in., and the piston speed $10/12 \; (300) = 250$ ft. per min. The horsepower of the engine required to drive this compressor is, therefore,

$$H = \frac{36.12 \times 50.26 \times 250}{0.70 \times 33{,}000} = say \; 20 \; hp.$$

The best types of air compressors to be found on the market are those that are advertised in *Coal Age* and we gladly recommend any of these machines as reliable and efficient.

[1] The expression "depth of submergence" is the vertical distance from the low-water level in the sump or wellhole, to the nozzle of the air pipe or the point where the air enters the column pipe. It is important that the column pipe should extend a few feet below this point, so that there will be no tendency of the air to escape through the bottom of the pipe.

Examination Questions

Nova Scotia Mine Managers' Examination, 1917

(Questions Answered by Request)

Ques.—In what particular series are the workable coal seams of Nova Scotia?

Ans.—There are two principal coal fields in Nova Scotia, on the main land, namely, the Cumberland and the Pictou fields. The coal seams in these fields belong to the carboniferous measures, and include that series of rocks overlying what is known as the "Millstone Grit," which constitutes practically the floor of the productive coal measures in this section. It is generally believed that these measures are the northern extension of the great Appalachian system of the United States. The same series of rocks constitute the productive measures of the Cape Breton and Inverness coal fields, on the island of Cape Breton, lying to the north.

Ques.—What is meant by a fault? What are the characteristics about a fault which determine the methods you should follow in locating the seam?

Ans.—In a geological sense, a fault is a dislocation of the strata, caused by the slipping of one section of a formation on another section, the slip taking place along a line of fracture crossing the bedding planes.

The term "fault" is often used in coal mining, however, to describe any irregularity in the coal seam, such as the thinning out of the seam, due to the presence of "rolls," "horsebacks," boulders, etc.; or to the erosion of the material forming the seam, owing to glacial action; or the coal may be cut by an ancient river bed.

The characteristics of a true fault or slip in the formation, which assist in determining the direction of the slip and the location of the seam beyond the fault, are the observed inclination or bending of the strata, at the fault, in the direction of the slip. It is also customary to find spars in a coal seam when approaching a fault, due to the crevicing of the coal by the movement of the strata and the infiltration of calcareous matter from adjoining formations. These spars often take the same general direction of the slip.

Ques.—How do we distinguish the various coal seams, at points wide apart?

Ans.—The different seams are recognized at widely separated points by their similarity and general characteristics; also, by their position in the series of rocks in which they are found; also, by certain characteristic fossils that make known the geological age of the formation and identify the series of rocks with similar series in other localities.

Ques.—How do you account for iron pyrites being more commonly found in the lower than in the upper portion of the coal field? Explain how pyrites has been deposited in the interstices of the coal in a seam.

Ans.—It is not a fact that iron pyrites occurs more frequently in the lower layers of a coal seam than elsewhere in the coal. Its occurrence in the seam results from its formation in connection with the deposition of the material forming the coal. The constituents of the pyrites originally formed a part of the plant life or vegetable matter deposited in the formation; or the iron and the sulphur may have been held in solution by the waters that inundated the material deposited.

During the formation of the coal, the sulphide of iron became concentrated, and this resulted in producing the pyrites in the various forms in which it occurs in the seam. The records of coal seams show that pyrites may occur in a variety of forms, as sulphur balls, or interfoliated with the layers of the coal, or be disseminated in finely divided particles in the mass of the coal; and this is liable to occur in any portion of the seam, depending on the conditions that existed at the time of the formation of the coal and deposition of the material.

The formation of pyrites in the interstices of a coal seam may be due to the infiltration of water containing sulphide of iron, or geological changes and conditions may have caused a concentration of this material in the place where it was found.

Ques.—What are folds, monoclines, anticlines, synclines, drags?

Ans.—These are geological terms of more or less general application. A "fold," in a geological sense, results from the buckling of the strata in such a manner as to represent a fold in a cloth, the strata remaining continuous but being folded upon itself.

A "monocline" in geology may be described as a single bending downward or upward of the strata along an axis, in distinction from a double bend downward and upward, as occurs in the case of an anticline or a syncline.

The term "anticline" describes an upheaving of the strata along an axial line, the strata being first bent upward and then downward so as to form a ridge.

A "syncline" refers to a sinking of the strata along an axial line, so as to form a depression, the strata first bending downward and then upward so as to form a valley.

The term "drag" is probably an English expression, not commonly used in this country. We are unable to find any reference to the term, however, in English works treating on geology and cannot define or explain its meaning.

Ques.—How do you account for the following geological fact; namely, that a seam of coal is thickest where the overlying rock beds are thinnest?

Ans.—Assuming that the question refers to the thickness of the overburden or depth of cover overlying the coal, the decrease in the thickness of the seam with the increasing depth of cover, is probably due to the great weight of the overburden resting on the coal, which has a tendency to squeeze the formation and decrease the thickness of the seam. On this account, the thickest coal would naturally be found where the cover is thinnest and the seam has not been compressed.

Legal Department

Coal Broker's Right to Commissions

By A. L. H. Street
Attorney at Law, 829 Security Building, Minneapolis, Minn.

A subscriber of *Coal Age* asks information as to the liability of an operator for brokerage commissions in the following stated circumstances:

Territory was assigned to a salesman on a commission basis, and he obtained numerous contracts running from one to two years; which were accepted by the operating company. For a time shipments were made with fair promptness, but fell off at the beginning of car shortage and higher prices. The operator excused short deliveries on the ground that only half enough cars were obtainable. Even this percentage of delivery has not been maintained, and it appears that the operator's remaining production has been sold outside the particular territory, on the open market. The operator has asked the salesman to negotiate sales on the open market and to use his endeavors to secure cancellation of orders under the contracts mentioned.

Salesman Entitled to Commissions on Undelivered Coal

The questions are presented: Is the salesman entitled to commissions on the undelivered coal called for by the contracts? Is the operator liable to the customers for nondelivery under such contracts?

Except as there may be undisclosed provisions in the salesman's employment contract or in the contracts with the customers, it is quite clear that these questions must be answered in the affirmative.

There can be no doubt that so far as the operating company has failed to make deliveries under its contracts, without being prevented from doing so because of its own fault and for the sole purpose of obtaining the benefits of advanced market prices, the salesman is entitled to the full amount of commission he would receive on the company performing its contract obligations. And under the same circumstances the customers are entitled to recover damages for breach of their contracts, measured by the excess of market values at the times and places when and where deliveries should have been made above the contract prices.

However, if the operator protected itself under the salesman's employment contract by providing that commissions should be due only on deliveries or on deliveries and payment therefor, no commissions could be claimed on deliveries actually prevented by car shortage or other conditions beyond the operator's control.

Similarly, if the contracts of sale exempted from liability for unavoidable transportation delays, etc., the customers would have no valid claims for nondeliveries fairly falling within such provision.

But, on the facts presented by our correspondent, the operator has clearly broken its part of the salesman's contract, and he and the customers have enforceable demands against the operating company.

Breach of Coke Sales Contracts

Injury to the business of a dealer through delivery to him of inferior coke by the manufacturer, and its resale without knowledge on the part of the dealer of the defective character of the fuel, is recognized by the United States Circuit Court of Appeals for the Sixth Circuit as being subject to compensation in a damage suit against the manufacturer. (Whyel Coke Co. vs. J. V. N. Yates, 221 Federal Reporter, 603.) In this particular case, however, the court holds that the evidence was insufficient to bring the suit within the application of the rule mentioned and permit the court to award damages.

Defendant, having contracted to receive a quantity of coke, rejected delivery on the ground that fuel previously delivered under the agreement contained an excessive percentage of sulphur, rendering the coke injurious to products manufactured in its use as fuel. Before finding that defendant's proof was insufficient to entitle him to relief on this ground, the court recognized the validity of such defense when supported by evidence. In other words, where a dealer has established a valuable business in handling coke and suffers loss of customers as a direct consequence of the failure of a manufacturer to deliver fuel up to the standard contracted for (the resale to the customers being innocently made, of course), the damages recoverable by the dealer for breach of the contract are not limited to the ordinary measure—excess of the value of the fuel delivered above that contracted for—but include injury to the dealer's trade, when that injury naturally follows sale of inferior commodities. There must be clear proof, however, of both the injury and of the amount of profits lost, so that there is available a fair basis for an award.

Producers Cannot Combine to Injure Retailer

In its opinion the Circuit Court of Appeals cites an earlier decision of the corresponding court in the Eighth Circuit (Hartman vs. Central Coal and Coke Co., 111 Federal Reporter, 96), wherein it was decided that if coal producers combine to injure the business of a dealer by refusing to sell to him at less than retail prices, he is entitled to recover compensation for injury to his business as a direct result of the combination. Reference to the Hartman case shows that there, too, the proof failed to bring the facts of the case within the general rule announced.

Treating the seller's side of coke sales contracts, the court in the case first cited holds that where the buyer wrongfully refuses to receive fuel contracted for, the seller is entitled to recover the excess of the agreed price above the cost of production, and that wrongful repudiation of the agreement by the seller justifies the seller in suspending manufacture of further coke to fill the contract, without affecting his right to recover damages measured as above stated.

Coal and Coke News

Washington, D. C.

The organization of the Tidewater Coal Exchange is now complete. Rembrandt Peale, the commissioner, has opened his office in the Woodward Building, Washington, D. C. He is being assisted in the organization of the exchange by G. N. Snider, assistant coal traffic manager of the New York Central R.R. L. A. Snead, who represents Chesapeake & Ohio and Virginian shippers in Washington, is also doing important service in the work being conducted by the exchange.

Commissioner Peale has been advised by J. W. Searles, the deputy commissioner for New York harbor; Harry Boulton, the deputy commissioner for Philadelphia harbor; G. F. Malone, the deputy commissioner for Baltimore harbor and J. W. Howe, the deputy commissioner for Hampton Roads, that their preliminary plans for handling shipments practically have been completed.

The Tidewater Exchange has issued a bulletin giving the history of the movement for such an organization and the objects it hopes to accomplish. The bulletin also contains the rules governing the Exchange and the consigning pool numbers.

To perfect the organization of the National Association of Coal Producers, a meeting of the secretaries of the coal trade association will be held in the auditorium of the Interior Department building, July 26 and 27. The call for this meeting was issued by Francis S. Peabody, the chairman of the Committee on Coal Production.

It is expected that every trade association in the United States will have representation at this meeting. In the producing districts where there are no associations, arrangements have been made with operators to have representation at the meeting. No meeting of retail coal dealers has been called by the committee on Coal Production. Publication in the daily press that such a meeting is to be called led to the formal denial of the announcement at the coal committee's offices.

The hope is expressed in Washington that it will not be necessary to call a meeting of retailers with the idea of fixing the amount of their profit. Now that the price of coal at the mines is known and the commission of the jobber has been fixed the margin of profit earned by the retailer can be figured by any one interested. For this and other reasons it is believed unnecessary to have the retailers enter into a coöperative price-fixing plan. The difficulties of such an arrangement are apparent, although it is believed by coal experts here that a workable plan for defining the retailers' margin of profit can be arrived at if necessity therefor should arise.

In a general plan for the reorganization of the Council of National Defense, it is understood that there is no intention of making changes in the committee on Coal Production.

In connection with the insinuations which have been made by members of each branch of Congress with regard to the conduct of committees of the Council of National Defense, it is understood that a quiet investigation of the committee on Coal Production has been conducted by disinterested persons. Those who made the investigation are understood to be ready to make a highly commendatory report on the work which is being done by Mr. Peabody and his associates.

Actual pooling of coal was begun on the Baltimore & Ohio and Western Maryland piers at Baltimore July 16. It has been found impracticable to attempt putting the pooling plan into effect at New York, Philadelphia and Hampton Roads until Aug. 1.

Some modification has been found necessary for the pool numbers of mines shipping over the Baltimore & Ohio and Western Maryland. A committee of shippers met with the executive committee of the Tidewater Coal Exchange and definite pool numbers were assigned for the coal from specific mines. These numbers have been printed in a separate schedule and are to be distributed to the shippers using the Baltimore & Ohio and Western Maryland piers. A similar plan will be carried out for coal handled by the Pennsylvania, the New York Central and the Buffalo, Rochester & Pittsburgh.

Operators of coal mines in the smokeless fields met July 17 in the auditorium of the Interior Department and freely agreed that the Government is to have the coal it wants, when it wants it and that it shall be of the best available grade. The matter of price was left entirely in the hands of the Government with the single qualification that the right to appeal to the Court of Claims was reserved.

Francis S. Peabody, the chairman of the Committee on Coal Production, called the meeting in order to arrange for the supply of 5,367,876 tons of low volatile coal needed for the use of the Government. Two million tons of the amount needed is for use of transports which require practically as high-grade coal as do battleships. Since the production along the Tidewater railroads is 196,000,000 tons the amount required, Mr. Peabody pointed out, is but 4 per cent. of the production and is no burden to the industry.

There was no division among the operators in their desire to be helpful to the Government. The only questions raised had to do with insuring equitable distribution.

The principal resolution adopted by the operators reads as follows:

"That we reserve all rights of appeal to the Court of Claims. We accept such allotments as may be made by the cabinet officers who are members of the Council of National Defense or such agency or agencies as may be designated by lawful authority respecting coal for Government use, and necessary adjustments between producers to equitably adjust the burden and cause shippers not supplying the Government directly to supply their fair proportion of coal to Government shippers to take the place pro tanto of coal furnished the Government."

Another resolution provided that the special state committees previously appointed from most of the coal states, and new committees also of seven members each to be appointed in the states not already represented, shall supply to the Committee on Coal Production detailed information to be used in formulating a plan of "equitable distribution of any burdens or hardships that may be put upon operator, shipper or consumer in the working out of this plan."

Still another resolution adopted provided that the Coal Production Committee shall "check and compile this data and advise as to the equitable allotment both as to the various Government grades of coal to take the place of the coal withdrawn for the use of the Government."

A fair price, which will admit of a reasonable profit for the coal operator was promised again by the Secretary of the Navy when he addressed the meeting in the afternoon. He urged the operators to throw their businesses into the balance, just as their sons are putting in their lives to win the war. In times such as these no man must consider that he owns a coal mine, the Secretary said, but he simply must consider himself a trustee to manage the property. He praised the action of the steel men in dismissing the question of price and entrusting that part of the negotiation to Uncle Sam. At the conclusion of Mr. Daniels' speech, the operators arose and gave three cheers for the Secretory of the Navy.

A comparison between the demands made by the Government upon men of military age and upon those possessing materials needed for the conduct of the war ran through the entire speech of William B. Colver, of the Federal Trade Commission. He pointed out that the Government has conscripted the personal services of all men between 21 and 31. None doubts, he said, that the Government has the right to call upon these men to do military service. Now that the Government needs smokeless coal, which is just as essential to the waging of war as are soldiers, the contribution of this necessity should be made as willingly as the young men obey the call to the colors, Mr. Colver asserted. He reasserted his opinion that the situation could best be met by a pool in the hands of the Government. He outlined how, in his opinion, such a plan could be made workable without doing injustice to anyone.

The assertions of Mr. Colver with regard to the pooling plan brought forth a statement from Mr. Peabody that he disagreed with the representative of the Federal Trade Commission on that point. He also revealed that arrangements have been made for a full discussion of the Federal Trade Commission's proposal between himself and Mr. Colver within the next few days.

Operators are certain to receive a fair price for their coal, if the matter is left to the Government, Mr. Peabody declared in his address to the assembly. He admitted that his opinion of the Government official has changed decidedly since he came to Washington. No one of them, he said, has any idea of taking advantage of anyone. He said there should be no hesitation on the part of the operators to agree to furnish the coal needed by the Government, which, he pointed out, is only about 4 per cent of the coal produced in the smokeless districts.

HARRISBURG, PENN.

Governor Brumbaugh on July 12, signed two bills important to the mining industry, and in signing the inheritance tax bill took a "slap" at the coal operators and the senate.

Senate bill No. 53, introduced by Senator Catlin, which the Governor approved relates to coal leases. A recent discovery by leading banks and trust companies, which act as guardian or trustee for coal estates is that they have no authority to make changes in coal mining leases to conform with present-day conditions. The bill authorizes alterations with the approval of the Orphans Court.

Throughout the state, especially in the anthracite region there are scores of leases entered into over a generation ago that require changes agreeable to the coal companies, or their successors, and the heirs of the original lessors. But notwithstanding the fact that both sides wanted the changes, there was no legal right given trustees or fiduciaries to make them and the only solution was an act of assembly.

One of the most important changes required in old coal leases pertains to the payment of the taxes. When these instruments were entered into the tax on coal land was a nominal one and this led to lessors in some cases agreeing to take care of the taxes. But now the taxes on the coal lands have increased to such an extent that some instances are found where the lessors royalties are less than the amount of taxes.

This act goes into effect immediately.

The second mining bill approved by the Governor, is known as the Holleran Bill No. 221, and was pushed forward by the mine workers of the bituminous region.

This bill amends the act of May 11, 1911, entitled "An Act to Provide for the Appointment of County and City Inspectors of Weights and Measures," by extending the authority to these sealers to inspect the scales at coal mines, and repeals the old law giving the mine inspectors of the state this authority.

The Governor has signed the Woodward bill placing a 2 per cent. tax upon direct inheritances. The measure was signed reluctantly, the Governor says, in a statement he issued.

The Governor's reference to the present exorbitant profits of the coal operators is taken to indicate that the bill providing for the quadrannial assessment of coal lands will be vetoed. This measure would have done away with the next triennial assessment on coal lands, and would practically have established the values existing before the present rise in prices as the values upon which the coal companies would have been taxed for a seven-year period. If the measure were to become a law it would have enabled the coal operators to have dodged millions in taxes.

His statement in part says.:

"I repeatedly urged the responsible leaders in charge of the legislative program that it was imperative to provide additional revenue if the business of the state were to be adequately cared for. We had

revenue bills prepared imposing a small and entirely reasonable tax upon coal, oil and natural gas. These natural commodities, the gift of Providence to our people, are being rapidly depleted. They are consumed more largely without than within the state and our people are denied revenue from these disappearing sources of wealth. We also had a bill prepared placing a tax of one mill upon the capital stock of manufacturing corporations. This tax would in no important way have affected the state's well-known policy of fostering industry and manufacture. This was not opposed by many leading manufacturers.

We had reason to believe that these measures would pass. Had they passed this unjustifiably drastic tax on direct inheritance would have been unnecessary and would not have been approved."

The bills placing a tax on coal, oil and gas were passed by a large vote in the House and Senate, but were killed in the Senate committees.

"The same influences that clamored for large appropriations steadily opposed these taxes upon natural resources and upon the capital stock of manufacturing corporations. The Senate committees thus chose deliberately to tax the estates of poor and rich alike rather than to tax these natural resources which today are selling at such an advanced price as to make the owners abnormally rich in dividends and profits, and rather than to tax manufacturing corporations now extraordinarily prosperous and abundantly able to pay the proposed tax. The whole procedure was most unfair and against the welfare of the people.

Some of the increased expenditures authorized by the Assembly are in this national crisis necessary. They cannot be refused or withheld. To reconvene the Assembly to enact revenue producing laws is costly procedure and might not result in any substantial service to the people since the same potential influence that so carefully guarded certain special interests would again doubtless assert itself. But it may well be that a lesson of this sort is necessary to teach the people the truth."

The direct inheritance tax applies to all property of decedents going to direct heirs. It covers estates of every size, even to the smallest. There are no exemptions.

The question of the advisability of having a general board of county assessors in authority in each county throughout the state was debated by the state convention of County Commissioners on July 11. M. J. McLaughlin, one of the commissioners of Luzerne County, where a board of three assessors appointed by the court has charge of the assessment, stated that the advantage of a general board was evidenced in a more accurate assessment of the vast valuations of coal tracts.

The assessments always are hotly contested unless made very accurately, and each general assessor has a mining engineer to assist him in getting exact data. The argument of the men from the hard coal fields on this question seemed to make a deep impression upon commissioners from the bituminous region.

Shipments of anthracite coal for June, according to reports of the Anthracite Bureau of Information at Wilkes-Barre, established a new record, not only for that month, but for any month in the history of the region. Mine and washery operations were both pushed to the limit permitted by the supply of labor and cars, and they responded by a record-making tonnage of which railroad shipments amounted to 7,049,037 tons, an increase over the preceding month (which in turn had been the maximum May record) of 131,512 tons. This is the first time in the history of anthracite mining that the shipments have exceeded 7,000,000 tons.

The director of the Bureau stated that this record, made in spite of a pronounced shortage of labor, exceeds the most optimistic anticipations and more than keeps the promise made by the operators to the Federal Trade Commission that the production of 1917 would be increased over 1916 and the public requirements would be supplied.

PENNSYLVANIA

Anthracite

Avoca—A large section of the residential district is seriously menaced by mine settlings and conditions within the last two weeks have become so alarming as to force several families to change their places of residence. Gardens carefully planted by people who heeded the patriotic call for such endeavor, have been completely ruined and great fissures are apparent over an area of several town blocks.

Tamaqua—Plans for the extension of the Lehigh & New England R.R. from here to the coal mines at Cranberry, have been abandoned for this year owing to wartime conditions, resulting in a shortage of labor and high cost of materials. The Cranberry, Harwood and Crystal Ridge collieries are owned by the companies affiliated with the Lehigh Coal and Navigation company, which controls the railroad.

Tower City—Extraordinarily damp, sultry weather for nearly an entire week had an unusual effect in the mines of upper Dauphin County, retarding ventilation to a degree never before known. Allen Horn, William Smith and James Roher, miners at the West Brookside colliery, were severely burned by an explosion of gas on July 13, believed to have arisen from this cause.

Luzerne—The state police are trying to trail the thieves that entered the Louise mine of the Raub Coal Co., on July 12, and stole the tools of 17 miners. The miscreants completely wrecked drilling machines, shovels, picks and other tools of 20 other miners. They also stole dynamite, powder, fuses, lamps, etc., belonging to the men and from the coal company's storehouse.

Morea—The C. M. Dodson Coal Co., on July 14, posted notices that a Liberty Bond will be presented each month to an employee working full time as a reward for faithful service. At the end of the month the names of all men who have not lost a day will be placed together and a drawing held. The employee whose name is pulled will get the bond.

Inkerman—Nine hundred men at the No. 6 colliery of the Pennsylvania Coal Co. displayed their patriotism on July 14 by producing 5000 tons of coal, sufficient to fill 2000 mine cars or 120 freight cars. This is an average of more than five tons for each man. The idea of a "Big Day" originated among the men. They decided to work their hardest from morning to night in producing a maximum quantity of coal. It is customary ordinarily for miners to leave for home as soon as they cut sufficient coal to keep their laborers busy for the day.

Bituminous

Connellsville—Forty per cent. of the surgeons in the employ of the H. C. Frick Coke Co. at its various coke region mines, have enlisted in the Reserve Medical Corps. The Frick company will try and retain the balance of its surgeons in order to operate its plants successfully. It employs five district surgeons, each of whom has an assistant besides a resident surgeon at each plant.

Kinport—The Hastings Coal and Coke Co. has sold the Kinport plant to the Watkins Coal Co. for a consideration said to be about $100,000. The plant is modern in every respect and is working to full capacity at the present time. The transaction includes the plant, coke ovens, miners' houses, etc.

Indiana—The Caldwell Coal Mining Co., owning a mine on the C. & C. branch of the Pennsylvania R.R., near Black Lick, Indiana County, has sold its operation to Vernon F. Taylor, of Indiana, Penn. Mr. Taylor will make developments as fast as possible and equip the mine with modern machinery, and will build houses for his miners. The deal includes about 150 acres of coal, a tipple and other mining buildings. The consideration was in the neighborhood of $75,000.

Pittsburgh—E. M. Buka, representing the Valley Camp Coal Co., has agreed with the Councilmanic Finance Committee and the Director of Supplies that during the remainder of July and the whole of August the company will sell coal to the city for $3 a ton. When Director Booth recently sent inquiries to 1000 coal companies, only one—the Valley Camp company—responded, with a bid for July coal at $5.10 a ton.

Uniontown—With only 87 of the 1375 unsecured creditors of Josiah V. Thompson, banker, opposing the proposition, it was announced on July 13, by the Thompson creditors' committee that the sale of the Thompson coal lands to Louis W. Hill and his associates in the Northern Pacific R.R. has been approved by the committee. The Hill syndicate has been given a 30-day option to buy the coal properties for the secured indebtedness and $5,000,000, which will be paid to the unsecured creditors, who will realize 40c. on the dollar for their claims.

T. J. Mitchell, formerly general manager of the W. J. Rainey interests in the Connellsville region, has purchased for himself and associates the plant of the Greenough Coal and Coke Co. on the Chesapeake & Ohio R.R. in Pike County, Kentucky.

WEST VIRGINIA

Weston—The Mountain State Coal Co. has commenced the opening of a new mine at Horner, and plans for extensive operations on its lands.

Lumberport—The Cambria Coal Co. will shortly start construction on a new mine that is to be opened near this point opposite the Laura Lee mine of the Hutchinson Coal Co. This development will be one of the most up to date in the state. All machinery will be electrically driven. The contract for the erection of 50 houses will be let within a short time.

Fairmont—The Bethlehem Coal Co. has three mines loading coal on the Western Maryland R.R. in the Helen's Run field. The siding for the third mine is almost completed, the work being so far along that coal has been shipped. Over 1000 tons has been loaded from this plant. The temporary tipple is still being used, but the permanent one is being constructed and will be ready for operation within a short time.

Charleston—The coal operators in the Kanawha, New River and other near-by fields it is said may resort to motion pictures to get before the nation the actual conditions and handicaps under which they are laboring, in order to adequately meet the national and international demand for West Virginia fuel. Chief among these handicaps is the shortage of railway cars and the scarcity of labor, with which to work the mines. A plan is being discussed for the production of films depicting the actual situation in which the West Virginia coal industry finds itself at the present time. Such pictures would show the inadequacy of transportation facilities and the actual conditions at the mines, together with other interesting features and sidelights of the business. This would be presented in the nature of the operators' brief in the court of public opinion, and intended to counteract the antagonistic and frequently maliciously garbled reports that have been widely circulated in the attempt to shift the blame for the present situation in the fuel markets from the shoulders upon which it rightfully belongs to those of the operators.

KENTUCKY

Owensboro—The Pittsburgh-Kentucky Coal Co., of Pittsburgh, Penn., has purchased all the holdings and properties of the Memphis Coal Co., at Island, in McLean County, Ky., and will continue the operation and development. George Gehres, of Pittsburgh, will be superintendent of the mines, and Sam Mendel, also of Pittsburgh, vice-president and general manager. The latter will have his headquarters at Owensboro. Improvements at the mines will include a new tipple to replace that burned some months ago and additional miners' houses. It is the purpose of the new owners to operate the property intensively.

Frankfort—Vocational training for the 13,000 coal miners in southwestern Kentucky is being worked out by V. O. Gilbert, state superintendent of public instruction, and representatives of the miners' union. It is proposed that not only the miners but the members of their families shall have the advantages of the training.

Middlesboro—Discussing reports that had reached Washington to the effect that certain coal operators in Kentucky would not stand by the agreement on maximum price on coal, E. S. Helburn, chairman of the Kentucky Coal Operators' Committee, said a thorough investigation made by him showed that fully 95 per cent. of the Kentucky operators are standing by and will stand by the agreement as reached in Washington. Mr. Helburn has called on all of the operators of the state to advise him of any instances they learn of violation of the agreement so that steps may be taken to check such practices.

Hazard—The Kentucky Jewel Coal Co. has sold its Lothair mine to the Anaconda Coal Co., of Bramwell, W. Va., of which W. A. Pritchard is president. H. E. Bullock, president of the Kentucky Jewel company, stated that his firm proposes to engage in other development work elsewhere in the near future.

Whitesburg—Continued improvement is noted in the car situation in the Elkhorn field of eastern Kentucky, operators reporting a much freer movement of coal cars. Operations throughout this field report a much better run now, with night and day shifts, than at any time in the history of the development of Kentucky's eastern coal fields.

OHIO

Columbus—Realizing the urgent necessity of getting more coal to the Northwest, the railroad board of the Council of National Defense has ordered the abandonment of two trains on the Hocking Valley R.R., which have been in daily operation for more than 25 years. By taking off these two passenger trains, 24 per cent. more coal

can be hauled over the road to Toledo, for shipment to Duluth and other Northwestern ports on the Great Lakes. Reports from the Northwest indicate that there is a shortage of 1,000,000 tons of coal and that if this condition is not remedied steel plants and other factories engaged in the making of war supplies will be greatly hampered, and may have to close down before the winter is over.

ILLINOIS

East St. Louis—The big washer here of the Southern Coal, Coke and Mining Co. was obliged to discharge all its colored help during the recent local race riots in order to have the assurance that the property would not be destroyed. This has seriously handicapped the company, as there is a shortage of white labor. The smaller sizes from several mines are taken care of at this washer, which is one of the largest in the state.

Personals

Lonnie G. Bray, of Williamson, W. Va., has been appointed district mine inspector of the 14th district to succeed John W. Gates, recently resigned. Mr. Bray's headquarters will be in Williamson.

C. E. Lesher, a coal specialist of the Geological Survey, testified recently before the Public Utilities Commission of New Jersey as to the best practices in securing by-products from the manufacture of illuminating gas.

Earl Henry, chief of the West Virginia Department of Mines recently returned from an inspection trip through the 5th mining district. He inspected work in Marshall, Ohio, and Brook Counties and found the car supply better than it had been for many weeks. Labor was, however, scarce throughout the entire field.

Frank J. Duffy, president of the Engineers' Society of northeastern Pennsylvania, now a major of engineers in the National Guard of Pennsylvania, will be tendered a reception by the Engineers Society on Wednesday evening, July 25. The members of the society are anxious to show "Duff" how much they appreciate him.

Walter J. Kearns is now representing the Hyatt Roller Bearing Co. in the western Pennsylvania field, taking the place of A. H. Schamehorn, who was transferred to the line shaft bearing division of the same company. Mr. Kearns has had considerable experience in coal mining, being formerly general superintendent of the Hecla Coal and Coke Co. of Pittsburgh.

Obituary

William D. Sauters, president of the Sauters Coal Co., Cleveland, died suddenly on July 9. Mr. Sauters was connected with the coal industry for about 30 years and operated mines in the Pittsburgh No. 8 district.

Thomas H. Owens, a prominent mining man, died at Montrose, Penn., on July 12, of a complication of diseases. Mr. Owens was employed for many years as outside superintendent by the Parrish Coal Co. and when his firm was taken over by the Lehigh & Wilkes-Barre Coal Co. was placed in charge of operations in the Sugar Notch district. He was 55 years old.

Edmund I. Humphries, aged 42, general manager of the Newborn Coal Co., a coal operator of Carrolltown, Penn., together with his wife and 15-year-old son, Edmund Jr., were murdered while automobiling near Carrolltown. According to the story told by George C. Thompkins, secretary of the company, with offices in Philadelphia, who was with the Humphries in the auto at the time, three masked men stepped out in front of the car and commanded them to get out of the machine. When they did so the men shot Mrs. Humphries and her son to death, but Mr. Humphries gave some struggle but was shot several times and beaten over the head. Mr. Thompkins ran and saved his life. The police are holding Mr. Tompkins in the Ebensburg jail as an important witness until further investigation is made. Although the hills were searched for miles around, no trace of the supposed masked men has yet been found.

Recent Coal & Coke Patents

Coal Car Guard. C. K. Frederick, Detroit, Mich., 1,221,434, Apr. 3, 1917. Filed Oct. 16, 1916. Serial No. 125,816.

Mine Car Door. E. F. Tubach, Bernice, Penn., 1,221,112, Apr. 3, 1917. Filed Sept. 5, 1916. Serial No. 118,544.

Coal Dump. C. B. Cheek, Enterprise, Iowa, 1,221,416, Apr. 3, 1917. Filed Nov. 22, 1915. Serial No. 62,830.

Air Supply to Mechanical stokers. W. R. Wood, London, Eng., 1,221,125, Apr. 3, 1917. Filed May 13, 1915. Serial No. 27,872.

Briquetting Machine. J. F. Lovejoy, New Rochelle, N. Y., 1,221,878. Apr. 10, 1917. Filed Apr. 9, 1913. Serial No. 759,911.

Coal Handling Machine. W. E. Hamilton, Columbus, Ohio., 1,222,286, Apr. 10, 1917. Filed May 2, 1914. Serial No. 835,841.

Locomotive Stoker. N. M. Lower, assignor to Locomotive Stoker Co., Schenectady, N. Y., 1,222,430, Apr. 10, 1917. Filed Jan. 20, 1912. Serial No. 672,334.

Firing Chamber for Powdered Fuel. W. D. Wood, assignor to Fuel Saving Co., Allentown, Penn., 1,222,344, Apr. 10, 1917. Filed Nov. 11, 1915. Serial No. 60,827.

Mining System. G. G. Hughes and J. F. McDuffie, Bessemer, Ala., 1,221,860, Apr. 10, 1917. Filed Jan. 3, 1912. Serial No. 669,294.

Automatic Furnace Stoker. G. A. Kohout, assignor to Kersto Corporation, Chicago, Ill., 1,222,109, Apr. 10, 1917. Filed Apr. 30, 1915. Serial No. 24,943.

Hoisting Bucket. J. H. Wilson, San Mateo, Calif., 1,222,834, Apr. 17, 1917. Filed Feb. 14, 1916. Serial No. 78,100.

Dump Car. C. H. Clark, assignor to Clark Car Co., Pittsburgh, Penn., 1,223,148, Apr. 17, 1917. Filed Nov. 14, 1912. Serial No. 731,304.

Chair Support Structure for Mining Machine Drills. F. Funk, assignor to Funk Bros. Mfg. Co., Chicago Heights, Ill., 1,222,752. Apr. 17, 1917. Filed Apr. 19, 1915. Serial No. 22,385.

Grate for Automatic Stokers. J. Reagan, Philadelphia, Penn., 1,223,830, Apr. 24, 1917. Filed Sept. 19, 1916. Serial No. 120,914.

Automatic Coal Feeder. F. S. Seymour, Manchester, Iowa, 1,223,626, Apr. 24, 1917. Filed May 20, 1916. Serial No. 98,711.

Miner's Can. L. McClasky, Butte, Mont., 1,223,991, Apr. 24, 1917. Filed Dec. 5, 1916. Serial No. 135,246.

Mechanically Operated Grate. H. Bauer, Vienna, Austria, 1,223,661, Apr. 24, 1917. Filed Nov. 6, 1915. Serial No. 59,912.

Coal Car. A. Papp and J. Chistoff, Detroit, Mich., 1,224,094, Apr. 24, 1917. Filed Jan. 29, 1917. Serial No. 145,207.

Automatic Mine Gate. T. J. Osborne, Premier, W. Va., 1,224,010, Apr. 24, 1917. Filed Nov. 10, 1916. Serial No. 130,629.

Automatic Stoker. F. Viggers, Des Moines, Iowa. 1,227,707, May 29, 1917. Filed Mar. 27, 1917. Serial No. 87,121.

Deflecting Plate for Smoke Flues. M. C. Huyette, Buffalo, N. Y. 1,228,023, May 29, 1917. Filed Aug. 23, 1916. Serial No. 116,455.

Briquetting Machine. G. W. Rigby, Pittsburgh, Penn. 1,227,831, May 29, 1917. Filed Aug. 8, 1913. Serial No. 783,752.

Method of Mining Coal. H. A. Kuhn, Pittsburgh, Penn. 1,228,448, June 5, 1917. Filed Aug. 14, 1914. Serial No. 856,848.

Automatic Dumping and Righting Mechanism for Tiltable Dump Cars. J. M. Druecker, Stone City, Iowa. 1,228,540, June 5, 1917. Filed June 30, 1916. Serial No. 106,767.

Means for Preventing Explosions in Mines. A. H. Stow, Maybeury, W. Va. 1,228,985, June 5, 1917. Filed Feb. 28, 1910. Serial No. 546,620.

Feeding and Burning Fine Fuel. W. D. Wood and H. C. Barnhurst, assignors to Fuel Saving Co., Allentown, Penn. 1,228,632, June 5, 1917. Filed June 22, 1916. Serial No. 105,120.

Operating Mechanism for Shaker Grate. R. C. White, Birmingham, Ala. 1,228,626, June 5, 1917. Filed Oct. 31, 1916. Serial No. 128,751.

Industrial News

New York, N. Y.—The Malcolmson Briquet Engineering Co. recently opened an office at 50 Church St., New York City.

St. Louis, Mo.—J. H. McKelvey was recently appointed sales manager for the Laclede-Christy Clay Products Co., in the place of H. K. Lackland, resigned.

Coal Creek, Wash.—The Pacific Coast Coal Co. will install new coal washers here and make extensive improvements for the accommodation of a larger crew.

Wilkes-Barre, Penn.—The Pennsylvania Railroad Co. has completed negotiations whereby it disposes of its anthracite coal properties to the M. A. Hanna Coal Co. of Cleveland, Ohio.

Wilkeson, Wash.—The contract for the construction of 60 coke ovens for the Wilkeson Coal and Coke Co. has been completed and these ovens will be placed in operation shortly.

Altoona, Penn.—The Pennsylvania R.R. has awarded a contract for the removal of its large coal banks at Denholm, to be transported to Altoona for use on locomotives and in the shops.

Columbus, Ohio—The Ohio Mining Co. has been incorporated with a capital of $75,000 to mine and sell coal. The incorporators are: Fred Essex, S. Cottingham, D. Wallace, B. Davidson and J. A. Stalter.

Nelsonville, Ohio—The Carr Run Coal Co. has been incorporated with a capital of $20,000 to mine and sell coal. The incorporators are: Dan Shay, Ellen B. Shay, J. F. Lawson, Lena Lawson and Timothy Shay.

Pittsburgh, Penn.—The National Mill Supply Co. of Fort Wayne, Ind., was recently made exclusive representative for Fory Wayne and vicinity for the Homestead Valve Manufacturing Co. of Pittsburgh.

Alliance, Ohio—The Lexington Coal Co. has been incorporated with a capital of $5000 to mine and sell coal. The incorporators are: J. C. Holzwarth, J. S. Spring, G. F. Lamb, Milton W. Baker and C. S. Westover.

Uhrichsville, Ohio—The Urichsville Fuel Co. has been incorporated with a capital of $5000 to mine and sell coal. The incorporators are: L. H. Hartman, J. B. Riffle, John L. West, Tracy Haverfield and J. K. Law.

Shawnee, Ohio—The Wile Coal Co. has been incorporated with a capital of $10,000 to mine and sell coal. The incorporators are: John H. Wile, Frank A. Marshal, Charles P. Malloy, Joseph Grimley and Kate Wile.

Washington, D. C.—The French government has dispatched a mining engineer to this country to secure machinery and to discuss with American engineers the problems arising in the opening of mines in the north of France.

Logan, Ohio—The Murphy-Hocking Coal Co. has been incorporated with a capital of $20,000 to mine and sell coal. The incorporators are: Frank Murphy, Thomas J. Murphy, W. M. Morgan, John F. White and J. J. Hogan.

Cincinnati, Ohio—The H. J. Briscoe Coal Co. has been incorporated with a capital of $10,000 to mine and sell coal. The incorporators are: J. H. Briscoe, L. B. Briscoe, J. S. B. Bodell, W. B. Heyser and Sylvester Hickey.

Baltimore, Md.—Five thousand acres of coal lands in Garrett County, Md., have been secured in separate purchases by T. M. Dodson, of Bethlehem, Penn. P. D. Browning, engineer, of Bethlehem, Penn., will undertake development.

New Lexington, Ohio—The Pike Coal Co. has been incorporated with a capital of $60,000 to mine and sell coal. The incorporators are C. L. MacEachan, Dr. R. W. Miller, E. H. Packer, W. J. Paxton and Dr. G. S. Courtright.

Cleveland, Ohio—The Davidson Coal Mining Co. has been incorporated with a capital of $25,000 to mine and sell coal. The incorporators are: Robert Bursner, George Harpham, George E. Meier, John A. Dunn and George T. Odbert.

Hazard, Ky.—W. H. Turner of The W. H. Turner Coal Co. recently transferred an important coal lease near Hazard to T. F. Connell, Curt Rose and others who will organize a company at once and start development of the property.

Monday, Ohio—The Monday Coal Co. has been incorporated with a capital of $20,000 to mine and sell coal. The incorporators are: Frank E. Green, Charles A. Green, William H. Cooksey, George G. Dupler and Charles C. Devol.

New Straitsville, Ohio—The Coalgate Coal Co. has been incorporated with a capital of $10,000 to mine and sell coal. The incorporators are: Frank Hoy, Jr., Ben F. Nutter, Charles Slatzer, William Alexander, Jr., and Harry L. Hite.

Birmingham, Ala.—The Walter A. Zelnicker Supply Co., St. Louis, Mo., is now represented in the Birmingham district by Thomas A. Hamilton, for the past 14 years connected with the Crane Co. Mr. Hamilton's office will be at 1018 Woodward Bldg., Birmingham.

Chicago, Ill.—Harry E. Dennie, for many years connected with the rubber industries, has been appointed general manager of the Imperial Belting Co. of Chicago. W. S. Bloomer has been appointed general sales manager of the same company with headquarters in Chicago.

Springfield, Ill.—J. W. Hevron, division superintendent of the Illinois Central R.R., says that the road is doing 70 per cent. more than normal business on the division, a large part of which is supplied by the mines. These are working six days a week throughout this section.

Greenville, Texas—The Higrade Lignite Co. has been organized at Greenville with a capital stock of $10,000. Incorporators, as shown by articles of incorporation filed in the office of Secretary of State Bartlett at Austin, are: F. J. Phillips, J. D. Middleton and Walter Anderson.

Muskogee, Okla.—The Summit Coal Mining Co. has been organized and charter has been filed in the office of Secretary of State Lyon at Oklahoma City. The company has a capital stock of $8000 and the incorporators are: R. A. Evans, H. R. Swan and J. J. Harman, all of Muskogee.

Vinita, Okla.—The Bluefield Coal Mining Co. has been organized at Vinita, with a capital stock of $10,000, according to charter filed in the office of Secretary of State Lyon at Oklahoma City. The incorporators of the company are: P. E. Overton, Lula May McCulloch and R. D. Shelton, all of Vinita.

Waynesburg, Penn.—W. Harry Brown, coal operator, of Pittsburgh, who recently opened a new coal plant on a tract of 1000 acres at Grays Landing, in Greene County, has purchased 186.6 acres of coal and surface in Monongahela Township. The consideration was given as $183,510.12 in cash.

Hamilton, Ont.—President Robert Hobson of the Steel Co. of Canada announces that the company will almost immediately commence the construction of a coke-producing plant, with a capacity of from 800 to 900 tons per day, which, under present conditions, will require about 20 months to complete.

Poteau, Okla.—The Adams Coal and Mining Co. has been organized at Poteau, and charter has been filed in the office of Secretary of State Lyon at Oklahoma City. The company is capitalized at $12,000 and the incorporators are: C. R. Randall and H. L. Adams of Fort Smith, Ark., and Ed McGregor of Poteau.

Whitesburg, Ky.—The Broad Bottom Coal Co. has been organized by Judge John F. Butler, Mrs. Ida Butler, Stoney Amick and others of Pikeville, for the development of Dry Fork coal lands. It is said the first shipments will be made within 60 days. The development will be on the Louisville & Nashville main line.

Marion, Ind.—The Marion Machine Foundry and supply Co. recently purchased the Scottdale Machine and Manufacturing Co. of Scottdale, Penn. The latter plant will continue its established lines of manufacture which it has followed and will be operated as a branch of the Marion Machine Foundry and Supply Company.

Athens, Ohio—The Ohio Mining Co. recently purchased the Coe farm of 500 acres, in Trimble Township. The company officials announced that three large mines would be opened at once, with modern equipment. The Coe tract in the Sunday Creek Valley was the last of the big coal acreages remaining unsold in that district.

Whitesburg, Ky.—The Caudill Coal Co., recently organized here by M. J. Moss, Dr. E. S. Moss, J. B. Snyder, L. W. Fields and others has, begun the development of the Watson Caudill coal land tract just below Whitesburg on the L. & N. main line. The company has also acquired other new holdings, all of which it will develop this year. A new town will be built.

Johnstown, Penn.—The Johnstown Coal and Coke Co. has been organized with Andrew B. Crichton and Harry A. Crichton as the principal owners. A charter has been granted the concern and offices have been opened in the Farmers' Trust and Mortgage building. The new concern is a selling corporation and will handle the output of the Beachley Coal Co., the Berryburg Coal Co. and others.

Mayking, Ky.—The Mayking Coal Corporation has been organized here by William A. Forester, B. A. Bass and others of Nashville, Tenn., for the development of 2000 acres of Elkhorn coal lands including the Hardaway tract on Pine Creek. The new company will have a capacity of 600 tons daily to start with and expects to be ready to begin shipping coal within 90 days.

New Haven, Conn.—In order to better serve the trade in New England a Western Electric Co. office and warehouse has been opened in New Haven. This is located at 135 Wood St., with Tyler L. Holmes in charge. Another branch will be opened shortly in Baltimore, Md., with S. Greenfield, formerly of the Philadelphia house of the Western Electric Co. in charge. This branch will be located at 425 East Oliver Street.

Whitesburg, Ky.—The Smoot Creek Coal Co. was organized here this week by Col. John A. Webb, David Hays and Charles H. Back with a capital of $20,000. The new company will develop the Frazier coal lands at the Mouth of Smoot Creek, several miles below this city on the main line of the Louisville & Nashville R.R. A daily output of 500 tons will be developed. Col. John A. Webb will be manager of the operation.

Mater, Ky.—The Elkhorn Coal Co. has increased its capital stock from $30.000 to $100,000 and removed its offices to Lexington, Ky. The company has lately acquired 1500 acres of coal lands and will proceed with the development of the new property. T. D. Cassidy will be general manager of the plant while S. L. Bastin and Dr. W. E. Bannister of Lexington will be president and secretary and treasurer respectively.

Pottsville, Penn.—Due to the fact that breweries are demanding cash on delivery for their goods, many of the proprietors of small saloons in Schuylkill County are giving up the business, notwithstanding the fact, that they have paid the county treasurer $200 each for licenses. Beer at $7.50 per barrel and small call for wine, the men say, is driving them to the coal mines. Five retail dealers quit the business in one mining town on July 10.

Pottsville, Penn.—It is likely that a new washery will be built by the Philadelphia & Reading Coal and Iron Co., which is planning to recover the coal from banks about 50 years old near the abandoned shaft at St. Clair. It is said the St. Clair banks contain about 50 per cent. of commercially valuable coal. A concrete wall is now being built around the banks and it is believed about 1,500,000 tons of small-sized coal will be recovered.

Johnstown, Penn.—The Latrobe Coal Co., with operations near Hillside, has added to its holdings by the purchase of 900 acres of mineral and 490 acres of surface land, including the property of the Inland Coal Co. The consideration is said to have $900,000. The Latrobe company has started a new opening and contemplates the construction of 150 houses for the families of the employees as well as other improvements. These are expected to double the capacity of the plant.

Ebensburg, Penn.—It is asserted by coal people in this district that the basic price of $3 per net ton for bituminous run-of-mine coal has resulted in a smaller market, and that some of the small operators have suspended business temporarily, confident that better prices will prevail. One man asserted that his firm was receiving $5 a ton for coal on the cars; another admitted his mine is idle, and that it will remain idle until a better price than $3 per ton can be realized.

Charleston, W. Va.—The Island Creek Coal Co., the Island Creek Stores Co., and the Island Creek Railroad Co., recently filed complaints against the Chesapeake & Ohio R.R., charging that since this carrier had changed its schedules the passenger service over the Island Creek road was entirely inadequate. The schedule now followed by the railroad company has no train service between Logan and Holden so as to connect with passenger service on the Island Creek road except on Sunday.

Whitesburg, Ky.—The O'Rear-Williamson Coal Co. has just been organized here by H. L. Hutchins and others with a capital of $26,000. The new company will develop the Henry Hall properties just above Whitco on the Louisville & Nashville.

The Cub Mountain Coal and Coke Co. has also been incorporated with a capital of $25,000 to mine and sell coal. The incorporators are: E. S. Runnells, Jr., Walter K. Noe, Henry G. Frost, Edward M. Ballard and Lorenz S. Sampser.

Spangler, Penn.—Between 80 and 100 dwelling houses are to be built this summer by the Clearfield Bituminous Coal Corporation which is said to be contemplating improvements at its mines in this vicinity. The mining and shipping facilities will be bettered and additional miners will have to be had. This will necessitate better housing conditions and the company will provide homes for all the men that it employs. The new houses are to be of modern type and will have many modern conveniences.

Portage—The Johnstown Coal and Coke Co., headed by Andrew B. Crichton, of Johnstown, Penn., has been organized and has purchased the holding of the Beachley Coal Co. here, and the Berryburg Coal Co. at Berryburg, W. Va. The Beachley interests controlled six operating mines in this vicinity. The Berryburg company is now veloping a new field and controls the production of some smaller West Virginia operations. Andrew B. Crichton is president of the new company and Harry B. Crichton is secretary and treasurer.

East Pittsburgh, Penn.—Within the recent past orders for mine hoists aggregating several hundred horsepower have been received by the Westinghouse Electric and Manufacturing Co. The largest hoist among these is a 700 hp. machine for a 300-ft. coal shaft at the Inland Steel Co.'s mines at Harmarville, Penn. This machine will make three hoists per minute. At the same property a 200-hp. motor will drive a man hoist which will make two 300-ft. trips per min. Several other hoists ranging from 350 hp. to 150 hp. have been sold for use mostly in Pennsylvania.

Scranton, Penn.—Alleging that the Scranton Coal Co., by "unlawful, negligent and unworkmanlike mining" has wrecked their property on Chestnut St., Elizabeth, Catherine and Helen Culkin, have started suit against the company for $5000 damages. The plaintiffs set forth that they are the owners of the land in fee simple. By reason of the negligent mining of the coal company, they allege, the surface has sunk several feet and a home on the plot has been badly damaged. They claim that under the property the various veins have an aggregate thickness of 75 ft. The company, it is further alleged, has failed to provide either lateral or vertical support.

New York, N. Y.—The meeting of the wholesale coal trade of New York City held at the Whitehall Club on July 12, for the purpose of hearing the proposed articles of incorporation and bylaws of the new organization, was attended by about 35 coal men. It was voted to form the organization but that there must be a minimum membership of 75, with an initial fee of $50 and annual dues of $100. Of those present 22 agreed to join. The name of the proposed organization will be the Wholesale Coal Trade Association of New York and it will be governed by a board of directors, of whom six were chosen at the meeting. They are W. A. Marshall, George M. Dexter, J. A. Hill, R. H. Burroughs, C. C. Harris and T. H. Watkins.

Pittsburgh, Penn.—The United Coal Corporation has taken over the properties of the Merchants Coal Co. in Somerset County, Penn., and Preston County, W. Va. These were recently sold at receivers' sale. The Merchants Coal Corporation has been formed as a subsidiary company to operate these properties beginning July 1. The property consists of Orenda No. 1 slope, producing about 1400 tons a day at Boswell, Penn., and about 10,000 acres of undeveloped coal land adjoining the Jerome mines of the United Coal Corporation; also the Tunnelton mine, producing about 600 tons per day at Tunnelton, W. Va., with about 5000 acres of undeveloped coal land, carrying the Upper Freeport bed of coal, together with a 6000-acre tract of virgin coal land, known as the Three Forks tract, also in Preston County, West Virginia.

St. Louis, Mo.—The Illinois State Council of Defense has sent to more than 1000 Mayors and village presidents and to the heads of public utility concerns and industrial plants the recommendations of its advisory committee on the production and distribution of coal, urging them to begin at once the storing of fuel for winter consumption at the point nearest to the place of ultimate consumption, to use every precaution to avoid local waste, refrain from the use of open top equipment, reduce free time at destination of coal to one day and where large industries own their own equipment to use for direct movement of coal from mines to destination. Coal operators, railroads and dealers have been asked to coöperate. The council will endeavor to get the State Public Utilities Commission to embody the recommendations in binding rules.

The St. Louis Coal Club, at a special meeting recently held at the American Annex, sent a telegram to George B. McGinty, Secretary of the Interstate Commerce Commission, protesting against the increased freight rate on coal of 15c. a ton from the Illinois mines to St. Louis, which went into effect July 1. A reply was received in which the secretary stated that the rate could not be suspended because it had already gone into effect.

Market Department

GENERAL REVIEW

Record-breaking shipments fail to relieve the pressure for supplies. Readjustment to new conditions in the bituminous trade brings the market to a standstill. Heavy movement in the Lake trade. Shortage of orders in the Middle West.

Anthracite—Promises of the big companies for heavier shipments this month are failing to materialize. With the bigger operators issuing statements showing record-breaking production figures, the dealers who are having these figures quoted to them by their customers are placed in an embarrassing position to make adequate explanation. The time is at hand when either the Federal Trade Commission or the operator should attempt to clear up this inconsistency, which is steadily becoming a matter of serious concern in trade circles. The fall season is now definitely in sight, and the most urgent appeals to shipping interest as to the prospects for obtaining tonnage are met with either direct evasions or only meager assurances. Dealers ordinarily have their full winter's reserves in by this time, and waiting for the fall trade to open up, but all yards are practically bare of supplies now, and the retailers are hard pressed to meet current orders.

Bituminous—The trade is still in the process of adjusting itself to the new conditions, in the course of which the prompt market has come to almost a complete standstill. Shipments are confined almost entirely to contracts and inquiry for free coal usually meets with no response; on what business is being done in the spot market, however, it is very largely at the Government maximum, although there is no evading fact that there are a few interests who are opposed to meeting this figure, and that some small tonnage is going at better prices. Buyers are also expecting the Government to take further drastic action in the matter of price fixing, which may force quotations to even lower levels, and are therefore showing a tendency to hold off. However, this cannot continue for long, as there is a very heavy consumption, and buying must soon start up again. The pooling plan will become operative at all points on Aug. 1, and is already in effect at Baltimore.

Lake Trade—There is still the same uncertainty concerning prices, and it is becoming obvious that until the Government officials get together and take some real definite action on this matter, the situation will remain up in the air. There are some who feel that the market should be allowed to take its natural course, while others are quite willing to meet the $3 maximum, and still others express the belief that the Government will soon fix an even lower price. The price limitation has not as yet affected the retail trade to any appreciable extent, due to the fact that the dealers have considerable stocks acquired at relatively high prices, which they do not feel come within the price limitation. The Ohio mines shipped three million tons more of coal to the Lake ports up to the middle of the current month, than in the same period last year and it is expected that the movement up the Lakes for the current month will amount to about 4,000,000 tons.

Middle West—Expectation of further action by the Government in reducing prices has caused consumers to drop out of the market, and buying is slower than at any time in the past year. A number of shippers for the first time in many months are in actual need of orders on certain sizes, and there is little hope for improvement until the public awakes to a full realization of the actual situation. While retailers are beginning to cancel orders because of their limited storage facilities, the railroads are taking advantage of the situation to pick up some extra tonnages. The steam demand has also slowed up some, though there are a good many inquiries from Chicago and the Northwest.

A Year Ago—There has been little change in either prices or amount of consumption. Steam grades everywhere are holding up well. Anthracite stocks are not accumulating in consumers' bins as rapidly as might be wished. Both car and labor shortages are anticipated in the fall.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

Boston	Year Ago	July 21	July 14
Clearfields	$1.10@1.60	$3.65@3.75	$3.60@3.70
Cambrias and Somersets	1.35@1.75	3.65@3.75	3.60@3.70
Pocah. and New River[1]	† 2.85@2.90	5.10@5.20	5.10@5.20
Philadelphia			
Georges Creek (Big Vein)	1.90@2.00	6.00@6.25	6.00@6.25
W. Va. Freeport	1.15@1.25	5.25@5.50	5.25@5.50
Fairmont Gas mine-run	1.40@1.50	5.50@5.75	5.50@5.75
Pittsburgh (steam coal)[2]			
Mine-run	1.30@1.40	3.00@3.25	3.00@3.25
¾-in.	1.40@1.50	3.50@3.75	3.50@3.75
Slack	* .80@ .90	3.00@3.25	3.00@3.25
Chicago (Williamson and Franklin Co.)[2]			
Lump	1.55@1.65	3.45@3.55	3.45@3.55
Mine-run	1.20@1.30	2.70@2.80	2.70@2.80
Screenings	† .95@1.05	2.70@2.80	2.70@2.80
Gross average[3]	$1.41@1.57	$3.96@4.13	$3.95@4.12

	Gross Averages[3]	
	1917	1916
Mar. 10	5.36@5.61	1.53@1.68
Mar. 17	4.80@5.19	1.46@1.65
Mar. 24	4.64@4.94	1.49@1.66
Mar. 31	4.20@4.44	1.46@1.61
Apr. 7	4.07@4.36	1.44@1.60
Apr. 14	4.01@4.35	1.45@1.61
Apr. 21	3.83@4.14	1.46@1.62
Apr. 28	3.81@4.12	1.45@1.62
May 5	4.04@4.40	1.45@1.59
May 12	4.64@4.98	1.44@1.59
May 19	5.08@5.54	1.42@1.56
May 26	5.10@5.58	1.41@1.55
June 2	5.00@5.46	1.47@1.63
June 9	4.80@5.24	1.52@1.72
June 16	4.77@5.23	1.50@1.66
June 23	4.81@5.15	1.51@1.67
June 30	4.79@5.15	1.46@1.64
July 7	3.88@4.35	1.41@1.57

[1] F. o. b. Norfolk and Newport News. [2] Per net ton. [3] The highest average price made last year was $4.80@5.33 made on Nov. 25. *Price lower than the week before. †Price higher than previous week.

GOVERNMENT MAXIMUM PRICES ON ANTHRACITE

The following are the gross selling prices on individual anthracite suggested by the Federal Trade Commission. The maximum for egg, stove, nut and pea may be considered a fair indication of the maximum mine prices of individual operators for sales to retailers involving domestic supply. For industrial business, prices on egg and pea may vary to some extent from the prices indicated:

	White Ash	Red Ash
Egg	$4.70@5.00	$5.20@5.50
Stove	4.95@5.25	5.45@5.75
Chestnut	5.05@5.35	5.55@5.85
Pea	4.25@4.55	4.50@4.80

Gross Selling Price—"Gross selling price" means the price at the breaker without deduction for selling expense, commissions to sales agents or coal sales companies, allowances or rebates or claims of any character, demurrage, storage expense, short weights, etc., and if coal is sold delivered only the net freight or other net transportation charges are to be deducted.

BUSINESS OPINIONS

Iron Age—Announcement of the result of the conference at Washington last week between Government heads and the committee of steel manufacturers gave an abrupt check to business in iron and steel on any large scale. The vague ideas the trade has entertained for some weeks of possible readjustments that would have far reaching effects were sharpened into real prospects by the President's message to business calling for the same prices to the public as those fixed by the Government.

Dry Goods Economist—By all odds the most important development at this time is the announcement by manufacturers of certain lines as to the shortening of discounts. The initial action in this direction was taken by a New York garment manufacturers' association, the new term, etc., taking effect on Tuesday of this week. Similar action is under contemplation by other organizations in the garment industry, and a notice of similar tenor has been sent out by an association of manufacturers in the millinery trade.

American Wool and Cotton Reporter—Fine wools, reported to be for Government purposes, were the feature of the market for the week under review. Large quantities of fine capes sold from 55 to 60c. per pound and fine territory sold readily when obtainable. The feeling in regard to the Government's taking over the control of wool seems to be dying down. The declaration of peace is the only thing which can substantially affect the market. It is generally thought it will be stronger in this event.

Bradstreet—While seasonal conditions hold distribution in the larger lines under a check there seems to be a little more snap to trade; certainly there is more doing in retail lines, industry is as active as ever, most crop reports are favorable, collections range from fair to good, money, which is easier, is in better demand, and instead of believing that the wire edge worked off general business a few weeks ago, the tendency is to be more optimistic and to bank on a relative heavy trade this fall. Governmental requirements, present and prospective, overshadow trends in ordinary lines.

Dun—The economic problems occasioned by the war are becoming more sharply defined, and doubts about the readjustments still to be experienced impose restraint on business in not a few directions. With price uncertainties continuing, and with the effects of the export embargo yet to be determined, there is hesitancy and waiting in many quarters, and in some instances rather more evidence of the seasonal lull than appeared last year. Commercial failures this week are 286, against 221 last week, 272 the preceding week and 303 the corresponding week last year.

Marshall Field & Co.—Current distribution of wholesale dry goods is considerably in advance of the same week of a year ago. The volume of road sales for both immediate and fall delivery shows substantial gains over the corresponding period in 1916. Merchants have visited the market in smaller numbers. Collections continue very satisfactory.

CONTRACT NOTES

Cincinnati—The Reliance Coal and Coke Co. was the only bidder on the contract for supplying 1875 tons of coal for county institutions here, making a bid of $6.45 a ton. While the prices offered are lower than those prevailing in the open market, they are so much above the prices obtained by the county a year ago that some dissatisfaction was expressed by the commissioners, and the bid was held over for investigation.

Columbus—Although bids had been asked from 39 coal dealers, Ohio State university authorities only received one proposal for the winter supply of coal. This would have entailed an expense of $79,000, whereas only $35,000 has been appropriated. The coal will be bought on the open market for the time being at least.

Hopkinsville, Ky.—The school board of this city has contracted for 18,000 bu. of coal at 11c., an increase of 4c. over the price which prevailed a year ago. This is at the rate of $2.75 a ton.

Columbia, Mo.—The University of Missouri will receive bids until July 27 for furnishing 10,000 tons of coal during the year beginning Sept. 1.

Boston—There was only one bid received in response to the city's inquiry for coal to supply the harbor institutions, and the price quoted was $9.25 per ton for a Pennsylvania grade delivered.

Philadelphia—The bids for furnishing the local school board with coal during the ensuing year, which totaled $160,000 more than last year, have all been rejected, and the board will ask for bids direct from the operating companies, and arrange to take care of the local hauling itself.

Current Events

Transportation Notes—Commissioner W. D. McKinney, of the Southern Ohio Coal Exchange, states that the Ohio mines have shipped three million tons more of Lake coal up to the middle of the current month than in the same period last year. For the week ending July 14, the Lake Erie Bituminous Coal Exchange reports that 800,000 tons were loaded, and it is expected that the current month will see shipments amounting to about four million tons.

Shipments of Pittsburgh Number Eight coal from Ohio mines for the month of June, totaled 1,230,780 tons, against 1,411,500 tons for June, 1916.

Fuel Shortage Item—The Southern Ohio Coal Exchange has sent a formal statement to the Senate Committee on Interstate Commerce in which it takes the position that "householders of small means, public utilities owned and operated by municipalities and all state, county and municipal institutions should receive preferential coal supply" and that manufacturing companies making large profits, railroads and other wealthy consumers be excluded from any arrangement providing for maximum prices. This position is taken on the ground that such industries are able to pay excessive wages with the result that they are attracting labor away from the mining operations and if profits are to be limited at the latter, this condition must become more aggravated. The statement also points out that the State of Ohio consumes approximately 30,000,000 tons more coal than it produces, and that any price regulation must be so arranged that it will not interfere with the free shipment of coal into the state.

The Attorney General of Ohio has expressed his dissatisfaction with the maximum price of $3 to $3.50 fixed at Washington and has requested that Governor Cox call a special session of the Ohio Legislature in order to compel a further reduction. He has also requested the coöperation of the attorney generals in the surrounding coal states.

The committees appointed by Governor Cox to investigate the reason for the high cost of coal met on July 13 and investigated a number of retailers, after which they issued a statement to the effect that they found the cost of handling coal varied from $1.63 to $2.10 per ton. The committee held further meetings during the current week.

On July 13 Senator Pomerene, of Ohio, made a bitter attack on the high prices being charged by operators, stating that profits were being realized as high as 200 per cent. above the scale fixed at the Washington conference, and that some coal producers were making as high as 800 per cent. on their coal. He stated further that if the Federal Trade Commission did not introduce a resolution authorizing the Interstate Commerce Commission to investigate and compel the coal men to make public all data concerning the cost of production, etc., that he would himself introduce such a resolution.

The Chairman of the Kentucky Coal Operators Committee claims that 95 per cent. of the Kentucky producers are adhering rigidly to the maximum price fixed at Washington.

The Central Coal Operators Association of West Virginia has issued a statement to its members warning them against any violations of the maximum price fixed at the Washington conference and stating: "Evidence of bad faith on the part of operators is liable to bring down upon the head of the industry a swift and sure punishment in the form of legislation that will permit the commandeering of coal mines. The Federal Government is in no mood to be trifled with, and all concerned are cautioned to adhere strictly to these prices."

A conference of about 500 operators, mostly from the smokeless coal field, was held with Government officials in Washington on July 17, to take up the matter of the Government requirements aggregating more than five million tons for the next year. The question of a price was left to be fixed later, when the Federal Trade Commission has completed its investigation of production costs.

Fairfax Harrison, Chairman of the Railroad War Board, has announced that passenger-train schedules, aggregating more than 16 million miles of train service a year, have been cancelled, and that this will mean a saving of more than one million tons of coal per annum.

A property owners' mutual coal company has been organized in Chicago, which plans to sell Pocahontas coal to all its members, made up largely of real estate owners, at $4.80 per ton despite market fluctuations. It is stated that the association has an option on a mine with a capacity of 300,000 to 400,000 tons per annum, and that it has provided large storage yards in different sections of the city.

Labor—Some disturbances have been reported from the strike area in Kentucky, reaching the stage of incipient riots in a number of instances, and the Governor late last week ordered some small units of the National Guard to the scene of the trouble. The operators claim that the strike has so far made little or no effect on the output, which continues about the same as before.

State investigators in West Virginia claim that production to the extent of 100,000 tons per day is being lost at different mines, due to disputes between the miners and operators over relatively trivial matters.

Legal—In the case of the West Virginia operators, for violation of the Sherman anti-trust law, the jury on July 12 rendered a verdict of not guilty in every instance.

Foreign Markets—Press reports under date of July 11 state that coal cards have been introduced in Berlin in order to regulate the winter supply. Apartments with heating stoves will be limited to a quarter of a ton per room and a maximum of a ton and a half for more than five rooms. Steam heated houses will be limited to half of last year's supply. Extensive strikes are also reported to be in progress in the Silesian and Rhine coal fields of Germany.

Atlantic Seaboard

BOSTON

Market lifeless; no current sales of any magnitude. Interest in conference this week. Shipments closely confined to contracts, from all fields. Anthracite unchanged.

Bituminous—The market is at a more complete standstill than we have known for several years. Receipts of Pocahontas and New River are in nowise improved and there is still a marked absence of policy with respect to prices for current deliveries. No sales of any consequence are reported. The Pocahontas and New River agencies are mulling along on contracts and on Government requisitions and since these will absorb the current output on a price basis not too far from that recently indicated by certain of the authorities, there is unlikely to be any coal offering on the spot market until buyers show more interest than is the case today.

Stocks in this territory are fair, many of the large consumers having exerted themselves to buy all-rail, which purchases are now coming through in much better volume. Coal is being piled up to greater extent than was anticipated. This, added to the uncertainty with regard to the Government attitude toward prices, puts the market here into a state of extreme dullness. Inquiries are few, and when there is inquiry it is next to impossible to get quotations from first-hands. The result is a semi-indifference on the part of the trade and a disposition to go vacationing.

"Pooling" arrangements are again progressing. Officers of the exchange have been designated for Hampton Roads and they plan to get things into operation by Aug. 1.

There is a good deal of interest here in the conference of operators called by the Government for July 17; 1,800,000 tons of smokeless coals have already been arranged for by the Navy Department, and now both Army and Navy are seeking tenders for 3 to 4 million tons more. Wholesalers here are interested to see whether Pennsylvania and Maryland coals are also to be considered by the Government. If they are it will probably relieve several of the Pocahontas and New River shippers whose factors here are anxious over prospective receipts. The effect of the President's proclamation as to shipments to neutral ports is also being closely watched.

In spite of the dullness it is realized that buying will soon start up again. Much valuable time is being lost while all hands wait developments, but when the corner is turned we are sure to see an active market, if not in August, then in September.

There was only one bidder for supplying the City of Boston harbor institutions a week ago, and the price was $9.25 delivered on a Pennsylvania coal. The fact that water freights from Hampton Roads are on a $2.50 basis seems to have little influence on present prices for inland delivery; $9.50@10 is quoted for Pocahontas and New River f.o.b. Providence or Boston, and while sales are not brisk there is a steady demand. As to cargoes, buyers are reluctant to take on any comprehensive supply under present conditions. How long this state of things will continue is still an open question. There is no perceptible change in the Georges Creek situation. The fleet of barges normally devoted to moving a large tonnage of this grade is still being used mostly in the open market. No quotations have yet been made on the $3 net ton basis on this grade. Contracts are likely to claim the entire output for some weeks to come.

Early in the week there were a few tentative offers on the $3 basis, but careful inquiry discloses no such quotations today. Factors content themselves by saying, "Nothing to offer." Even comprehensive offers from some of the largest consumers are failing to draw any response from the mining regions. So long as there are plenty of contracts still in force on a $3.75@4 gross tons basis the operators will not lack for consignments. Shipments on such contracts have speeded up since July 1.

A few scattering quotations of $5.50 were heard for spot coal, f.o.b. mines, but at this writing there is no request for coal on that basis.

Bituminous at wholesale, f.o.b. loading ports, at points designated, is not being freely quoted. As last week quotations are not really representative.

	Clearfields	Camb. and Somersets
Philadelphia	$6.00 up	$6.25 up
New York	6.50 up	6.75 up
F. o. b. mines	3.64 up	3.65 up
Alongside Boston (water coal)	8.75@9.00	9.00@9.25

The only quotations heard on Pocahontas and New River are around $5.15 f.o.b. Norfolk and Newport News, Va., for spot coal, and $9.50@10 on cars, Boston or Providence, for inland delivery.

Anthracite—Local newspapers have played up the assurance of the New England Coal Committee, so-called, that domestic sizes would soon be shipped in increasing quantities all-rail. The public is given to understand that solid train-loads of anthracite have actually begun to come forward. No practical coal man believes, however, that enough can be sent all-rail to make up the deficit in Tidewater deliveries or enough even to affect the price materially. The railroads are already carrying all they can manage under present traffic conditions, and it is the temporary let-up in demand by the ultimate consumer that has most of the soothing effect just now.

The local politicians and other publicists now looking into the coal business rather give themselves away when they say that a much larger reserve supply of "bituminous will be kept in the pockets at the mines," for the benefit of New England industrial plants.

Anthracite receipts in this territory show no real increase. New York and Philadelphia loading ports are still shy of the sizes that the trade chiefly calls for. Egg, stove and chestnut are very scarce at all the piers. Broken continues in strong demand from the gas companies, and dealers find it harder to secure. The supply of pea improves slightly.

There is a dearth of "independent" coal offering. Firms that traded largely last season in the output of individually-owned mines have practically none now for sale, and say they are unable to get delivery. Prices f.o.b. New York for "independent" coal are in the neighborhood of $6.75 f.o.b. for stove, or about 85c. premium over the net circular.

NEW YORK

No let-up in demand for anthracite and supplies are not encouraging, although dealers are optiminstic. Mines are operating at top-notch. Some bituminous operators discouraged and may act as own salesagents. Tidewater prices easier and market becoming adjusted to condition.

Anthracite—With fall only about six weeks off dealers are wondering what there is in store for them. The dullness that usually envelops the trade in the middle of summer has not appeared this year and dealers instead of resting with their bins filled and ready for the fall business are kept busy with little or no coal on hand. The mines are operating at top-notch, but are unable to meet the heavy demand.

Retailers continue to complain and point to their full order books and empty coal bins to substantiate their contentions that they are not receiving a normal supply of coal. Orders received in April and early May are unfilled and consumers add their complaints to those of the retail dealers.

Receipts of domestic coals at the New York Tidewater do not appear to have increased; at least there has not been a larger tonnage available for spot buyers. The big companies have no surplus to offer

to the general trade after taking care of their customers, and many middle houses say they are unable to find any free coal in the harbor. Independent operators' supplies are being quoted at the prices suggested by the Federal authorities which are about $1 including the commission, above the company circular.

Egg and stove sizes are the shortest of the domestic coals. Chestnut is somewhat easier. Pea coal is tight but easier than either of the larger sizes.

Buckwheat No. 1 is in better supply and consumers with good bin supply are taking advantage of the situation to fill up. Rice and barley are long and individuals feel inclined to make concessions in order to move stocks. Loaded boats of either of the two sizes can be had at about 50c. less than the f.o.b. price.

Reports of near-by all-rail business indicate an easing up in demand, but there is a heavy call from New England and shippers are using every effort in sending supplies forward.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$5.50@5.65	.....
Egg	5.50@5.65	.....
Stove	5.75@5.90	.....
Chestnut	5.80@5.95	.....
Pea	4.30@4.85	$5.75@6.00
Buck	4.00@4.15	4.25@4.75
Rice	3.40@3.60	3.25@3.50
Barley	2.90@3.10	2.40@2.75
Boiler	.....	.....

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Bituminous—Buyers returning from the coal regions report much dissatisfaction among the small operators over the Washington price-fixing. It is the opinion of some of these operators that the matter of prices should have been left to the discretion of mine-owner and that they could have been amicably adjusted. Many of these operators it is said are considering the advisability of becoming their own sales-agents so as to secure the commission which now goes to the jobber, thereby receiving $3.25 per net ton instead of $3. Such action might seriously handicap some middlemen who heretofore have taken care of the tonnages of these small operators and found a market for the product which otherwise might have remained unsold except when badly needed

The market is becoming rapidly adjusted to the new conditions and although the new pooling arrangement has not been put into operation shippers are ready and willing to give it a fair trial.

Supplies are scarce. The line trade is demanding and receiving considerable coal that otherwise would come here. Demand is strong but little coal is being received to meet it. Some of the better grades are practically out of the market so far as spot coal is concerned, the operators sending scarcely enough here to take care of their contracts. For that reason quotations are seldom heard. The fair grades are a trifle easier.

On Tuesday the market was steady. There was a good demand and but little coal to meet it. The situation is becoming more serious and it may result in the closing down of many industrial plants.

Mine shipments were quoted at $3 net ton and $3.36 gross ton. With the lifting of the export embargo as regards shipments by rail into Canada it was said that mine quotations for coal to be sent there ranged from $3.75 to $4.25. The better grades were quoted at New York Tidewater at from $6 to $6.75 and the cheaper grades at $5.25 up.

PHILADELPHIA

Anthracite shipments here light. Dealers take steps to learn when they will be supplied. Car supply serious. Demand strong for all domestic sizes. Steam sizes fairly steady. Bituminous situation still unsettled. Almost all shippers selling at fixed price, but there are rumors of small tonnage sold at higher prices

Anthracite—The promised heavy shipments for July have thus far failed to materialize and with the last half of the month well under way there has not been the least improvement in conditions. Many dealers who have empty bins are being given so little encouragement by the big interests that they now despair of being able to fill the orders on hand this summer. Compared to the needs of the dealers practically no coal is coming this way from the companies and no one can learn when the policy is to be changed. The dealers are now becoming more than anxious, but the sales agents are all answering the appeals that they will surely be taken care of some time.

The newspapers have recently given considerable prominence to the increased shipments of anthracite made last month which has further increased the troubles of the dealers. Their customers point out this statement and the dealer can only say that he has not received the coal. Buyers cannot understand why this city should be discriminated against when other parts of the country receive their full supply.

As for several weeks, the dealers best cared for are a few selected customers of each individual operator. They are paying higher than company prices, but there are no complaints against this. There are a few such dealers who are beginning to accumulate some stocks of nut and stove coal, especially the former, and we know of a few dealers who have actually held up their orders for these sizes. These are the class of dealers who were quite wary of taking any orders at the low prices which ruled for such a short time in April; they have about now filled all their orders and having little storage room seem content to get some of the usual summer rest instead of going after more business. Of course such cases are very exceptional and confined to long established and successful dealers who are in position to ease up on the grind.

The dealers along the line of the Pennsylvania R.R. are if possible less fortunate than those on the Reading. The former have of late been afforded some relief, as the Lehigh Valley R.R. has removed its embargo and is allowing a limited number of cars to go to the Pennsylvania R.R. points in the city. At this writing Reading cars are being confined to that road's own lines. There probably was never a time when the car situation generally was so complicated and shipping agents must be constantly on the alert, though doubtless the ultimate object of greater car efficiency is being gradually obtained. Certainly the dealers are doing their share in this direction. Never before in the history trade have so many box cars been received by the retailers.

The demand for all sizes, from broken to pea, continues unabated. There really seems to be no broken for sale; there are many inquiries for it, but there is no let-up in the demand from contract customers and any spot coal would easily bring $5.50. Some operators report egg scarcer than stove, but locally stove still has the call. Chestnut is the easiest of the family sizes; it is far from plentiful, but where we find only one size in a yard it is usually chestnut.

As the season advances there is actual alarm among the representative dealers regarding pea coal. At this time of the year they could usually buy all they could store, often at reduced prices but now there are no accumulations of any kind. The fact that a dollar a ton above the Reading circular is considered a reasonable price late in July demonstrates the condition of the market.

While there are no so-called premium prices in the market now though the fact that the Trade Commission has fixed a maximum price gives a certain leeway to some shippers to get a little more for their production. We know of one case where a big yard has been almost entirely filled with all sizes purchased at top figures from the smaller operators. These shippers have necessarily been compelled, in a measure, to slight their regular trade who have been taken care of at moderate prices.

The steam sizes display no particular strength over last week and $3.50 to $3.75 for buckwheat is the ruling price. Rice is bringing around $2.25, with barley weak at $1.75. One of the larger companies still continues to store a slight production of rice, boiler and barley, which is in excess of their current demands.

No further steps have been taken in the matter of pooling anthracite and the committee, which was appointed by the individual operators, is quietly resting until a move is made by the larger companies. It is believed that the matter of the anthracite pool will not be gone into until after the bituminous pool, which has been lately arranged for, is in successful operation.

The local school board which faced a prospect of an increase of $160,000 in its yearly coal supply, has rejected all bids; it has decided to ask the mining companies to bid direct on the business and the board to make their own hauling arrangements. This business was formerly taken entirely by the operators, who sub-let the hauling to the dealers, but about 10 years ago they declined to submit bids. No doubt pressure of some kind will have to be brought to bear in order to have them take an interest now and all parties are watching the outcome with a great deal of concern.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for Tide are as follows:

	Line	Tide		Line	Tide
Broken	$5.00	$6.15	Buck	$2.90	$3.80
Egg	4.25	5.35	Rice	2.40	3.40
Stove	4.50	5.70	Boiler	2.20	3.30
Nut	4.60	5.65	Barley	1.90	2.15
Pea	3.20	4.10			

Bituminous—It cannot be said that the market has as yet entirely adjusted itself to the new selling conditions. While practically all quotations are being made at the $3.25 rate for mine-run coal, in accordance with the agreement made with Secretary Lane, yet there are persistent rumors that some houses are asking higher prices. While we have not as yet been able to locate any sales made at excess prices, we are confident that a small tonnage is actually being disposed of in that manner by people who feel that they are not bound by any agreement. The amount is very small, however, and in no way affects the working out of the agreement.

There is a strong feeling among the shippers that there must eventually be some kind of an adjustment whereby the high-grade coals will be accorded their rightful position as to prices. The idea is not that they should be sold at a higher price, but that the poor grades should be put at a lower level. Owing to the differences of opinion at Washington it is believed that prices are far from being definitely fixed; at least there continues to be much uncertainty in this market.

Production the present week has been better than the preceding one, but only because of the short tonnage in the previous period owing to the holiday inactivity. The coal producers feel that they have done their part and it is now up to the railroad companies to provide the cars and move the coal promptly This week the car supply was certainly not over 50 per cent. Of course labor continues to be a factor in holding down production, as the men were never more independent. There are no particularly serious labor disputes at present, but the men are quite indifferent as to working up to their possible maximum. One local concern lost an entire day at a large operation on account of the men joining in the hunt for some lost children.

The inquiries for coal continues as strong or even stronger than when the price was at $5 and over. Yet despite the numerous inquiries many consumers hold to the belief that coal will be even cheaper, due perhaps, to the many and conflicting newspaper reports on the situation.

The pooling plan for Tide coal has now been set to take effect here on Aug. 1, although it has already been started at some of the other shipping points. While the matter of grades has not been worked out yet in its entirety there is no doubt that everything will be in readiness for the inauguration of the plan at the time set.

BALTIMORE

The $3 mine basis becoming the standard for spot coals, although there are still some sales above this figure. Movement confined largely to contract and bunker coal. Anthracite scarce here.

Bituminous—In the face of the flat statement from Chairman Peabody of the National Coal Production Committee that the coal trade should live strictly up to the $3 mine basis, and 25c. shippers premium, arrangement, and the fact that a majority of jobbers and mine representatives here are standing firmly by that idea in all sales of spot coal, some business has undoubtedly been recorded here the past week at higher figures. Such sales are admitted of better grade coals as high as $4.50 in certain quarters. However, it appears to be but a matter of a short time before everything will be shaken down to the $3 and $3.25 basis.

Meanwhile there is no great amount of coal coming here outside of contract fuel or coals for export and bunker use. The fact that tonnage on free coal has fallen off considerably since the $3 basis was set, while general tonnage is said to be running about the same, might indicate that some mine connections have heretofore been holding out a part of their contract coals to take advantage of the recent high prices in the spot market. The Baltimore Tidewater Exchange is now in operation here. The first few days are said to have shown satisfactory results, although there are naturally a number of kinks to work out. All coal of one particular classification now goes on a specified track at tide terminals, and is drawn as desired by shippers, irrespective as to who the orig-

inal shipper or owner may be, and up to the amount of his own shipments.

Anthracite—Hard coal men here are puzzled. On the one hand they read reports that the largest amount of hard coal in history is being shipped, and on the other they face actual experience in paying premiums up to 75c. a ton for any quick deliveries and inability to get through anything like the amount of coal desired even at that advance over schedule. The long drawn out winter and fear of being caught short of fuel made consumers order early and heavy this spring and summer undoubtedly had an effect but the dealers can not figure that it was sufficient to cause the difference. All are now awaiting the conference in Washington which is expected to fix a new anthracite selling standard. Wiping out of excessive premiums is one thing looked for and which will be welcomed.

HAMPTON ROADS

Shipments fair. Receipts and movement from mines light. Shippers not quoting prices. Export license now required for cargo and bunker coal.

Shipments are moving fairly well in all directions though they are not heavy on account of the small supply of coal and the scarcity of vessels for the foreign trade. Receipts from the mines are still light, as is also the coal in transit. New England consumers seem to be trying to cover their shortage, as shipments to that territory are unusually heavy and would no doubt be still heavier if the coal was available for shipment.

The supply of vessels in the coastwise service is further depleted from time to time. It is now reported that the Luckenbach fleet of five tugs and thirteen barges is to be laid up. These vessels have been carrying coal on the coast four years. The steamer "Deepwater," building at Camden for Castner, Curran & Bullitt, Inc., is expected to be launched the latter part of this month. If she is not taken over by the Shipping Board she will be a distinct addition to the coastwise fleet, as her capacity is 12,500 tons, the largest vessel ever engaged in this trade. This will offset in a large measure the vessels which have been lost or withdrawn for other trades. The barges "Seneca" and "City of Washington," coal laden from Hampton Roads, in tow of the tug Luckenbach No. 4, have gone ashore on one of the Florida reefs. The tug went ashore also, though it is now reported that the tug and one barge have been floated and that the chances are good for floating the other barge.

Export licenses must now be secured for all cargoes of coal and for bunker coal supplied to steamers in the foreign trade. Particulars concerning cargo licenses are not yet available, but bunker coal may be furnished any steamer not bound to a port in Norway, Sweden, Denmark, Holland or their colonial possessions or dependencies. When steamers are bound to ports in these countries a license or permit must be obtained before the coal may be supplied. The effect of this regulation will be to put all steamers trading to this country under the control of the Government. If bunker coal is refused the voyage cannot be pursued. Just what regulations and formalities are required for cargoes will no doubt be available within a few days. There is expected to be some delay to steamers until things are in smooth working order. Preliminary advices indicate that the same regulations will apply for cargoes as for bunkers.

There is little activity in anthracite. Consumers seem to be holding off in the hope that prices will be reduced by fall. Also the moving date in this section is Oct. 1 and supplies are not usually laid in until after that date.

Dumpings at the Hampton Roads piers for the past several weeks were as follows:

	June 23	June 30	July 7	July 14
Nor. & West	121,023	140,787	99,789	117,442
Ches. & Ohio	94,090	101,858	89,239	81,769
Virginian	.....	86,911	82,943	82,769
Total	.....	329,556	271,971	281,980

Ocean Shipping

OCEAN FREIGHTS

Although unchartered steamers for export coal are still very difficult to obtain, we think the steamer market to certain destinations is somewhat weaker, owing to the scarcity of available coal for export. A few steamers for export coal were chartered since last report, but none of any importance have been reported.

We would quote freight rates on coal by steamer as follows:

Europe	July 9	July 16
West Coast Italy	.....	.....
Marseilles	$100.00 about	$100.00 about
Spain (Atlantic)*	30.00@36.00	30.00@36.00
Spain (Med't'n)*	32.40@38.40	32.40@38.40
South America		
Montevideo	$30.00@30.20	$30.00@31.20
Buenos Aires	30.00@30.20	30.00@31.20
Rosario	31.68@32.40	31.20@32.40
Rio Janeiro	[3]32.50 about	[3]32.50 about
Santos	[3]34.00 about	[3]34.00 about
Chile (good port)	17.50@18.50	16.50@17.50
West Indies		
Havana	5.50@5.75	5.25 about
Cardenas, Sagua	7.75 about	6.75@7.25
Cienfuegos	8.00 about	6.75@7.25
Port au Spain	10.75 about	10.25@10.75
St. Lucia	10.75 about	10.25@10.75
St. Thomas	9.00@9.50	8.75@9.25
Barbados	10.75 about	10.25@10.75
Kingston	7.50 about	7.00@7.25
Curacao[1]	9.00@9.50	8.75@9.25
Santiago	8.00 about	7.25 about
Guantanamo	8.00 about	7.25 about
Bermuda	7.00@8.00	6.00@7.00
Mexico		
Vera Cruz	9.00@10.00	9.00@10.00
Tampico	9.00@10.00	9.00@10.00

* Spanish dues for account of cargo. [1] And p.c. [2] Or other good Spanish port. [3] Net.

W. W. Battie & Co.'s Coal Trade Freight Repot.

COASTWISE FREIGHTS

Two dollars and fifty cents is the highest rate now asked on barges from Hampton Roads to Boston, other ports in proportion. Larger tonnage would be hard to secure were there any current demand, so few bottoms are now available to the open market.

Rates on Long Island Sound, New York loading, are still on the basis of $1.35@1.50, depending on destination; $4 continues to be paid to points east of the Penobscot.

Lake Markets

PITTSBURGH

Contract shipments heavy. Spot supplies relatively light. Expectation of further price revision.

The coal market is operating with a fair degree of smoothness. There are no reports relating to Pittsburgh coal being settled for at the agreed price with an understanding that a bonus is being accumulated to be paid later, but it is stated that several complaints as to this have reached Washington, referring to other districts. It is positively charged, however, that in the Pittsburgh district some brokers are dividing their commission with operators in order to secure coal. All dealers report that they have more inquiry than they can fill, it being much more difficult to buy coal than to sell it.

Contract shipments are now as a rule close to 100 per cent., in the case of both local consumers and Lake trade. Most of these contracts are at higher than $3, but even on $2.75 contracts operators are disposed to make full shipments. When spot coal was so much higher they shipped much less, prorating according to car supplies. The amount of coal left for the spot market is correspondingly reduced.

The expectation is common that there will be a further downward revision in prices when the Federal Trade Commission makes its report as to cost of production, it being doubted whether profits of 100 per cent. or thereabouts will be permitted indefinitely. A few observers predict that the market will decline of its own accord.

Car supplies are reported as somewhat better than for many weeks past and production is on a somewhat larger scale. While labor is not plentiful it is possible usually to load all the coal for which there are cars.

We quote the market at $3@3.25 for slack and mine-run and at $3.50@3.75 for screened coal, per net ton at mine, Pittsburgh district, according to the agreement.

BUFFALO

Bituminous unsteady as ever. No settled price. Shippers do not know what to do. Anthracite slowly meeting the demand.

Bituminous—The former uncertainty as to prices continues and will not cease until the Government takes some step toward asserting its authority or gives up the effort entirely. Shippers are divided as to the best move to make. Some say that the market ought to be allowed to take its natural course, others are willing to abide by the $3 price and still others predict that a lower maximum will soon be made and maintained. Some see a matter of patriotism in the selling at the fixed price, while others claim that the authorities should stay out of the business.

It is not denied that prices generally have declined a dollar or so. Practically no bituminous center is asking $5 at the mines now and though there is only a minor part of the operators selling at $3 the agreement has had a general effect outside of that. The result is that the coal is going on contract as much as possible, some shippers being able to sell pretty nearly all their coal in that way. Still nobody is satisfied with the prices and besides everybody is afraid to act independently, with the result that much of the coal is sold with a proviso, and some is turned over to regular customers with no price fixed.

The car situation is not improved. If that could be straightened out the complaint of excessive price would soon disappear, for consumers could then get what coal they need at normal prices.

It is estimated that fully two-thirds of the bituminous coal is still sold above the $3 maximum, but not above $3.75 at the mine for Pittsburgh, or about as follows:

Youghiogheny Gas	$5.30@6.00
Pittsburgh Steam	5.15@5.65
Ohio No. 8	5.10@5.60
Bessemer	5.00@5.50
Allegheny Valley	4.90@5.40
Cambria Co. Smithing	5.80@6.30
Pennsylvania Smokeless	5.55@6.05
All Slack	4.85@5.35
Cannel	6.00@6.50

All quotations are per net ton, f.o.b. Buffalo.

Anthracite—The situation is practically without change. As a rule the shippers are claiming that they are slowly catching up with the demand and will be in better shape by fall than they were last year, for, though the coal goes out as soon as it is furnished, the consumer is much better supplied than he ever was at this time of the year. An arrangement in the city retail trade provides for turning over so much coal every day to the dealers, so that the long lines of waiting trucks are no longer seen.

The Lake trade is active, shipments for the week being 133,650 net tons, according to the Custom House report, of which 31,200 tons cleared for Chicago, 48,550 tons for Milwaukee, 6300 tons for Racine, 2800 tons for Green Bay, 19,100 tons for Fort William and 23,700 tons for Duluth and Superior.

Freight rates are $1.25 to Racine, 75c. to Green Bay, 60c. to Chicago, 50c. to Milwaukee and 42½c. to Duluth and Fort William.

TORONTO, CAN.

Fuel Controller urges economy in coal consumption. Government takes action to speed up deliveries.

The Canadian Fuel Controller, C. A. Magrabli, has issued a statement urging coal users to lay in supplies at the earliest possible moment and to exercise the closest economy in the use of coal, substituting wood and coke wherever possible. He points out that deliveries of coal by water transportation or otherwise are distinctly below those of former years and that unless deliveries can be speeded up a heavy load will be thrown on the railways during the fall and winter. He has arranged with Sir Henry Drayton, chairman of the Canadian Railway Commission to take control of the coal transportation problem and hopes that Canada's fuel problem for next winter will be satisfactorily solved. The services of H. P. McCue of Pittsburgh, a leading authority on coal and transportation, have been engaged to facilitate the filling of contracts and prompt forwarding of shipment. He is opening an office in Pittsburgh.

The Mines Branch of the Department of Mines, Ottawa, estimates the total production of coal in Canada during the first quarter of 1917 at 3,590,991 short tons. The average rate of production is apparently less in Nova Scotia and British Columbia than last year, but greater in New Brunswick, Saskatchewan and Alberta. Coal exports during the three months were 501,570 tons, and imports 3,921,824 tons as compared with exports of 737,744 tons and imports of 4,002,892 during the corresponding period of 1916.

TOLEDO

Buying becoming more active. Dealers and steam users feel that the lowest price levels have been reached and are anxious to secure supplies.

Although there seems to be a fair supply here there is every indication that the demand will steadily increase from now on. No wholesaler has a large amount of coal and as the car shortage is still felt through-

out this section a general shortage of free coal is inevitable.

Retail dealers are beginning to buy in large quantities and as they expect no further drop in prices most of them are attempting to place orders for immediate shipment to stock their yards for the fall trade. A decided shortage of anthracite is evident about the city and the efforts of dealers to secure shipments immediately is not generally successful.

The steam trade remains quiet, and factories are in fairly good shape as to supplies. While not any of them have large supplies on hand, they are confident it will not be difficult to replenish their stocks when it becomes necessary. Wholesalers anticipate a good business in the near future when steam users start to prepare for a possible car shortage during the fall months on account of the necessity of having cars for transporting food and supplies for the Government.

Coal is being moved to this port for Lake shipment as fast as possible, but there is a decided shortage of motive power on some of the roads and wholesalers assert the car supply is little better than last winter. The Hocking Valley Ry. has taken two passenger trains from its schedule, which it had been operating between this city and Columbus in order to facilitate the movement of freight. Suitable vessels for coal carriers are still scarce and much coal is being loaded in barges which have lain idle at the docks for many years.

Prices on tons are as follows:

	Mine run	Lump and Egg	Nut and Slack
Hocking & Pomeroy	$3.25	$3.75	$3.25
West Virginia Splint	3.25	3.75	3.25
Kentucky	3.25	3.75	3.25
Pocohontas	3.25	3.75	3.25

DETROIT

Steam coal users buy sparingly. Domestic consumers show little interest. Lake trade gains in volume.

Bituminous—With the expectation that there will be a lower price at the mine fixed on coal, a considerable proportion of local steam plants are placing orders very conservatively. While their attitude perhaps finds justification in assertions made by persons prominent in departmental circles of the Government, Detroit coal jobbers maintain that instead of any further lowering of prices, there is reason to believe delays in buying may place the consumers in the position of having to pay a higher price than that now prevailing and with much less prospect of getting their requirements supplied.

It seems doubtful if there will be any more plentiful supply of coal, in view of the probable increase in requirements of munitions plants, while the railroads, within a few weeks will be less able to handle shipments, owing to the movement of crops and of war supplies. Consumers of domestic coal appear to be confident that their wants will be supplied whenever they wish to stock up.

Anthracite—Uncertainty is exerting a restraining effect in the anthracite trade. Retail dealers see the same reason for delay that imposes a check on soft coal buying, while consumers, having no present need of coal are hoping for a drop in price before the time comes when they must have it. Many of the consumers, however, have placed orders conditional on the market at time of delivery and quite a number already have their winter supply put in.

Lake Trade—Coal seems to be moving a little more freely to loading docks and the movement over Lake routes is increasing slightly in volume. Car shortage, delaying unloading of ore from freighters from five to seven days, is reducing the supply of tonnage offered for coal cargoes.

CLEVELAND

Wholesale market featureless. Demand good for all grades at prices fixed by Federal Government officials. Large movement of Lake coal.

The wholesale market has been featureless the past few days although there has been a good demand for all grades at prices fixed by Federal Government officials which were effective July 1. Movement of Lake coal continues to increase and last week the Lake Erie Bituminous Coal Exchange succeeded in loading about 800,000 tons, which was the largest week since June 1, the date that the Exchange started business. Commissioner Fred C. Baird expects the amount floated by the Exchange will reach 4,000,000 tons for the month of July.

No material reductions have been made as yet by the retail dealers as they claim that all stocks now on hand were bought at high prices and will have to be moved before they can make a reduction. It is quite likely they will have to change their minds, as the domestic consumers have stopped buying and are waiting for lower prices before placing their orders.

Following are the market prices per short ton, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack
No. 8	$4.40	$3.90	$3.90
Cambridge	4.40	3.90	3.90
Middle District	4.20	3.90	3.90
Hocking	4.40	3.90	3.90

COLUMBUS

Lake trade and steam business continue active, while domestic demand is at a standstill. Car supply has improved during the past week.

The Lake shipping, which is being rushed to the extreme is the best feature of the coal trade in Ohio. With producers and shippers straining every point to get a large tonnage to the head of the Lakes; little attention is paid to other departments. Steam business is also active in every way. There is little domestic demand, because of the uncertainty as to the future and also because of the disposition on the part of consumers to refrain from buying.

Steam tonnage is moving freely and there is no scarcity reported at any point. Large users have been trying to accumulate a surplus but their efforts have not met with much success. Quite a large part of the steam tonnage is purchased on contracts, many of which are considerably above the prices fixed by the conference in Washington. The steam tonnage bought on the open market is being sold at the fixed prices generally. Iron and steel mills are the largest users of fuel at this time, though railroads are taking a good tonnage to take care of freight movement.

Domestic trade is quiet as neither dealer nor consumers are disposed to buy to any extent. Quite a few of the dealers have rather large stocks on hand and consequently are not in the market. Consumers have been taking the advice of public officials to hold off in their buying until after Sept. 1 and consequently there is very little movement. If this tendency continues, there will be quite a rush for stocking purposes later on and it is feared that the orders can not be taken care of.

Lake trade is the most active phase at this time. Loadings at the docks at Toledo for both the Hocking Valley and T. & O. C. R.R. have been unusually large during the past week. The vessel movement is efficient and little time is being lost. Reports from the Northwest show that there is a marked shortage from the records of last year and that unless something is done to remedy the situation there will be a shortage at the close of navigation.

Production in Ohio fields has been better, owing to a better car supply. This is especially true in the Hocking Valley and Pomeroy Bend fields. In eastern Ohio production is still hampered by lack of cars.

Prices on short tons, f.o.b. mines, are as follows:

	Hocking	Pomeroy	Eastern Ohio
Rescreened lump	$3.50	$3.50	.....
Inch and a quarter	3.50	3.50	$3.50
Three-quarter inch	3.00	3.00	3.00
Nut	3.00	3.00	3.00
Egg	3.00	3.00	.....
Mine run	3.00	3.00	3.00
Nut, pea and slack	3.00	3.00	3.00
Coarse slack	3.00	3.00	3.00

CINCINNATI

Demand continues good from steam consumers, but price is more of a factor with prospects of further Federal intervention. Domestic market is quiet.

The inability of large consumers to secure contracts to take care of their fuel requirements for the coming year, or for the winter season, has served to maintain the strength of the steam market, regardless of the fact that a lower range of maximum prices fixed by the Federal Government is felt to be quite possible. It is generally understood that there is going to be real difficulty in maintaining the coal supply up to requirements unless there is a decided improvement in transportation conditions and large consumers much prefer to have contracts with reliable coal operators or wholesalers to resorting to the open market, as they must otherwise do.

Among retailers the inclination it to await developments with reference to maximum prices, as their customers have adopted that attitude and buying is not expected to be in any great volume until this question is setled. The movement of coal to the Northwest via the Lakes continues heavy, however, and is apparently limited only by the car supply, which remains the key to the situation, as it has been for months.

LOUISVILLE

"Government prices" in effect but market is very dull. Consumers appear to feel that Federal authorities have their problems well in hand.

In spite of the fact that the Kentucky operators are maintaining the prices fixed by the governmental representatives the demand is light. Meanwhile the newspapers continue to print many misleading statements as to the prices which are likely to prevail, the "profits" which the various handlers will be permitted, etc., and many consumers of all classes are postponing their purchases. This is causing a good deal of anxiety among the operators, who are advising their friends and regular customers that now is the time to purchase to insure having coal this winter. They are beginning to fear that, if purchasers continue to delay buying it will be impossible to get coal at any price in the winter.

With maximum prices fixed, the operators will naturally prorate their coal among their regular customers, which will leave the open market buyers unsupplied. Stocking operations are being much deferred in this territory. Labor is indifferent in sections where there are no labor troubles, the men declining to work extra hours in the interest of increased production and seeming to be unaffected by appeals to their patriotism. The strike in western Kentucky has not as yet caused a very great reduction in output. During the week the car supply has been improved.

Eastern Kentucky and Tennessee prices are $3.75 on domestic sizes, and $3.25 on steam sizes, f.o.b. the mines, the figure including the broker's 25c. Western Kentucky reports lump selling around $2.75; mine-run around $3.50 and nut and slack and pea and slack around $2.25, f.o.b. the mines, although there are rumors of coal sold below those levels.

BIRMINGHAM, ALA.

Buyers continue to withhold orders and new business was very light during the past week. Prices, in most instances, are being held firm at maximum figures allowed. Car supply good with most lines.

Consumers are still playing a waiting game with the evident purpose of trying to enforce price concessions, having an idea, it appears, that the mines are accumulating a surplus coal supply, which will shortly result in lower quotations. On the other hand the operators claim to have ample business in hand to handle their production for some time to come and have very little available coal for the spot market. Industries and railroads have no stocks on hand and are depending on daily receipts to maintain operations. One of the railroads entering the district had a representative in the field the past week endeavoring to place orders for 50,000 tons to take care of increased requirements, but had little, if any success in having his needs booked. This same line was entirely out of coal at two of its largest chutes, and the statement is made that not a railroad in the district has over a three days supply of fuel in stock. Quotations are about as follows per net ton mines: Pratt, $3.50, Black Creek and Cahaba, $3.75@4; Carbon Hill and Corona, $3.25@3.50; Big Seam, $2.75@3.

Production is reported to have been off 25% in some instances during the past week, all operations suffering in this respect to a more or less degree on account of the indifference of miners to the essentials of regularity and efficiency at a time when every pound of coal that can be mined is urgently needed.

Coke

CONNELLSVILLE

Decline continues. Price regulation expected. Holiday causes only slight decrease in output.

The spot coke market continues to decline and at this time after Independence Day is at the same level as at an equal period before the holiday. Taking $16 as the highest price paid for any considerable tonnage the top of the market is now $4 a ton less, although it is still eight times the price at which coke sold two years ago.

The passing of the holiday is only one influence in the decline, however, the other being the quite general expectation that there will be a reduction in price dictated by the Government or arranged under Government auspices. This would hardly occur until iron and steel prices are taken in hand, but that is expected for the very near future. Some coal operators, however, are complaining on the ground that coal price fixing should have been accompanied by coke price fixing, and pointing out that byproduct coke ovens are securing coal at

$3 or $3.25 and selling coke made from it at the present market.

Car supplies were very good all last week, many operations reporting 100 per cent. for several days, but difficulty was experienced in production so that in some cases all the cars furnished could not be loaded. There were many who predicted that if full car supplies were furnished there would not be enough labor to produce and load the coke the cars would accommodate.

If the authorities undertake to fix a fair price for coke they can hardly set it outside the limits of $5 and $6. The coke operator could hardly expect more for his coal than $3 a ton as he could not get a car rating in order to ship coal at all, and this would make about $4.50 for the coal needed to make a ton of coke, while on account of the rise of the byproduct ovens the beehive operator had practically given up expectations of making much profit on the conversion of coal into coke until the war boom upset all expectations.

We quote spot coke at $11@12 for furnace and $12@13.50 for foundry, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended July 7 at 349,218 tons, a decrease of 21,950 tons, and shipments at 355,688 tons, a decrease of 20,706 tons. The holiday caused a much less decrease than expected.

Buffalo—There is prospect of lower prices, if only because they have gone so high. Certain shippers show the tendency also by reporting that they have cleaned up their orders and are now going after new ones. They will not yet quote lower than $17 for 72-hour Connellsville foundry, $16 for 48-hour furnace and $14.50 for low grades and stock.

Birmingham, Ala.—Foundry coke prices continue to climb, $16 now being the spot quotation on high-grade product. Sales at $15.50 to the spot trade have been quite numerous, but have been confined to small tonnages, as no producers are in position to quote on large inquiries. The demand is very strong, business being offered during the past week calling for monthly deliveries as high as 4000 tons, which could not be placed in the district. Contract quotations range from $12.50 to $14. No quotations are given on furnace coke, such a nominal tonnage being available. Production is considerably off on account of scarcity of labor and hot weather conditions affecting the efficiency of the forces employed around the ovens.

Middle Western

GENERAL REVIEW

Buying has been less active on account of the fixing of maximum prices. Prospects of a coal shortage growing. Railroads taking any surplus offered.

Expectation among consumers of further price reductions at Washington has created a peculiar condition of affairs. The buying earlier in the week slumped more than any time during the past year, and retailers complain of receiving concellations in great numbers and in some instances the yards are full of storage coal. The shippers, for the first time in months, need orders on some sizes, and are making an effort to show consumers the importance of buying now before the situation becomes acute. Newspaper reports in the Mid-West country have been misleading, and until the general public are fully informed of the true conditions it is not expected there will be any heavier buying than usual during the summer months.

The railroads have taken advantage of the lull in domestic business and have made heavy purchases, and as a result the mines have not suffered from a lack of orders. Notwithstanding the slump in the demand for both steam and domestic coals, the situation has been singularly free from cancellations of contracts. Many steam users have made efforts to contract for storage coal, and some of them are trying now to make arrangements for next summer's supply. Their action is based chiefly on the removal of coal tariffs in Canada, and the blanket orders of foreign governments for all free coal in certain mining districts of the country.

During the past week embargoes have been placed by some of the Eastern roads which hinders movement to the Northern and Western markets. The Chesapeake & Ohio has placed a restriction which forbids the movement of coal in certain Western directions and which forbids reconsignment of its cars. The Baltimore & Ohio has refused to allow its hopper bottom cars to leave its own rails. The Louisville & Nashville also refuse to allow their equipment off their lines, and this seriously interferes with eastern Kentucky shipments. Operators are much concerned about these embargoes and expect the situation to be much worse later when railroad difficulties will increase.

The maximum prices have strengthened up the shippers who were selling for less on the theory that a higher price now will in part compensate for having to take a less price than the market warrants a little later.

CHICAGO

Chicago market less active and production has fallen off in most sections on account of car shortage and embargoes. Not much change in prices. Shipments of anthracite via boat show improvement.

Slow demand, especially by the domestic trade, afforded the railroads an opportunity to buy in large quantities. The lull in buying, is thought to be only temporary by most operators, and as soon as the householders are aware of the seriousness of the situation there will, no doubt, be a bigger demand on the dealers than any time heretofore. Chicago retailers complain that buying has practically stopped the past week, especially on bituminous coals, that their yards are as a rule limited in storage facilities, and until such time as the buying increases shippers will be compelled to withhold shipments. Expectations among consumers of further action at Washington is responsible for this setback, but since a number of the daily newspapers here are now calling attention to the gravity of the coal situation it is thought the public will have a better understanding of the matter and retailers will have sufficient orders to keep their teams busy.

Shipments of anthracite via Lake to Chicago the past week aggregated more than 52,000 tons which is an abnormal amount, but the coal moved out almost as fast as it arrived, and dealers are still far behind on orders.

The Franklin County mines have had a steady demand the past week, and no discounts are being made from the prices fixed at Washington. During the three months, April to June inclusive, these mines produced 1,586,000 tons in excess of the same period last year. The greater part of this tonnage has replaced Eastern bituminous in Chicago and the Northwest in retail yards, and at least 10 per cent. supplanting Eastern coal in the manufacturing of byproduct coke. Car supply has averaged about 62 per cent.

In Williamson County the mines have not been getting much more than 50 per cent. running time because of the poor car supply. This in itself was enough to overcome the cancellations of orders by retail dealers which continued for the first few days. The buying revived the latter part of the week. Prices have been very firm at the Government maximums of $2.75 for steam sizes and $3.50 for domestic.

Saline County operations have been seriously hindered the past week by car shortage. The free coal available moved at maximum prices which are somewhat below the spot market price on these coals a few weeks ago.

The Springfield district mines are working as near full time as car and labor supply will permit. These mines have not been affected by the recent slump of orders due to fact that most of the tonnage is tied up on railroad contracts.

Fulton and Peoria districts report almost full running time. Most of this coal is now being taken by the railroads, and very little free coal is to be had. All domestic sizes are firm at the maximum prices.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton and Peoria Cos.	Clinton and Sullivan Cos.	Green and Knox Cos.	Carterville
Domestic lump	$3.25@3.50	$3.25@3.50	$3.25@3.50	$3.25@3.50	$3.50
Steam lump	2.75@3.00	2.75	2.75	2.75@3.00	3.50
Egg	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.50
Nut	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.50
Mine-run	2.75	2.75	2.75	2.75	2.75
Screenings	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50	2.50@2.75

	Williamson and Franklin Cos.	Saline and Harrisburg	Poca. and W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump	$3.50	$3.50	$3.50	$3.50	$3.50
Egg	3.50	3.50	3.50	3.50	3.50
Nut	3.50	3.50	3.50	3.50	3.50
No. 1 nut	3.50	3.50	.....	.....	3.50
No. 2 nut	3.50	3.50	.....	.....	.....
No. 3 nut	3.50	3.50	.....	.....	.....
No. 1 washed	3.50	3.50	.....	.....	.....
No. 2 washed	3.50	3.50	.....	.....	.....
Mine-run	2.75	2.75	3.25	3.25	3.25
Screenings	2.75	2.75	3.25	.....	.....

Hocking Lump $3.50 Splint Lump $3.50

The movement of Hocking and Pocahontas coals to this market are limited due to heavier demands in other directions. Embargoes have interfered more or less with what free coal has been available to this market.

There has been no movement to speak of on Eastern Kentucky coals. Embargoes have restricted shipments to this territory and demand in other directions is taking care of the available tonnage. The new maximum price delivered at Chicago is at least $1.50 per ton below that of two weeks ago, and would create quite a demand were it possible to secure the coal.

MILWAUKEE.

Coal situation still tense, with the demand for anthracite far in excess of the supply.

Between the action of the State Council of Defense in spreading broadcast a warning that a coal famine in the Northwest is imminent, and the assurances of coal dealers that there will be a sufficiency of fuel and that prices will go no higher, the nervous consumer is left to guess out his own salvation. Householders are buying more than normal supplies, and manufacturers are piling up steam coal as a measure of safety. The July schedule of prices is still maintained. The city authorities just purchased from a jobber 2400 tons of Youghiogheny screenings at $6.55, and 320 tons of mine-run Pocahontas at $8, delivered. These figures represent a cut of 50c. per ton from offers made by dock companies.

The State Council of Defense has complained to Secretary of War Baker that Illinois coal operators are circularizing retail dealers in Wisconsin soliciting business at prices based upon the rate fixed by the Washington conference which was subsequently repudiated, and endeavoring to create an impression that the rate is permanent. This charge is denied by Illinois men. They hold that they are selling steam coal at the mines for $2.75 and domestic varieties at $3.50, with an allowance of an additional 50c. at mines under extraordinary expense.

The Board of Education at Oshkosh, Wis., has rejected all bids for fuel supplies, in the belief that coal is being held too high, and will depend upon the open market for the present.

Since the first of July cargo receipts at Milwaukee have aggregated 243,128 tons, of which 47,743 tons were anthracite. This makes the supply of anthracite received thus far 114,224 tons, which is somewhat less than normal.

ST. LOUIS

Conditions unusually quiet, with no domestic demand at all, and steam demand less than normal. Standard coal more active. Car shortage continues. Rate controversy disturbing. No Eastern coals.

The market is unsually quiet. There is no local domestic demand at all. The public are still expecting to get coal at a lower price, as the newspapers have been advertising this freely for several weeks past. However, to contradict this, the retail price of Mt. Olive coal advanced from $4.25 to $4.50 this week, and Standard advanced from $3.75 to $4 and $4.25

The difference of $1.25 and $1.50 between high grade and Mt. Olive is so great that domestic business is swinging to Mt. Olive and Standard, but the domestic tonnage is small.

There has been an easing up in the steam demand that has been quite noticeable locally, though Chicago and the Northwest are taking some coal and the railroad tonnage continues heavy. Some railroad short-time contracts have expired and a larger tonnage of Standard coal would be on the open market if the equipment were available. The Standard market continues to advance slowly and surely, and indications are that this will continue, whereas

Mt. Olive still remains below the standard open market price locally.

The Mt. Olive district operators are playing safe. They are not going to cause the Federal Trade Commission to investigate their affairs and they are pursuing a policy that is going to win them business in the future.

The high-grade market is dragging. The Iron Mountain territory is getting a good supply of coal now, but the Illinois Central territories are suffering, as car shortage conditions on this road are worse than anywhere else in the field, with the exception of the M. & O. The outlook for equipment improvement is extremely bad. There has been some offgrade Carterville going the rounds at about $3 for the domestic sizes and as low as $2.50 on mine-run, with screenings at the same price. This proves conclusively that there is not a combination to fix prices in that field, for the maximum of $3.50 for domestic and $2.75 for steam is not being obtained generally.

Dealers throughout this territory are pretty well stocked up and when buying begins the stocks will not last long and everything points to a congestion of orders that will be hard to take care of.

Practically no anthracite has moved in during the past week, and the same applies to the smokeless situation. Arkansas has dropped off almost all together.

The prevailing market per net ton f.o.b. mines:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump	$3.25@3.50	$2.35@3.00	$2.50@2.75
3x6-in. egg	3.25@3.50	2.35@3.00	2.50@2.75
2x3-in. nut	3.25@3.50	2.35@3.00	2.50@2.75
No. 2 nut	3.25@3.50	.....	.....
No. 3 nut	.....	.....	.....
No. 4 nut	.....	.....	.....
No. 5 nut	.....	.....	.....
2-in. screen	2.50	.....	1.90@2.00
2-in. lump	.....	.....	2.25@2.50
3-in. lump	3.25	2.25@3.00	.....
Steam egg	3.25	2.25@3.00	2.25
Mine run	2.50@2.75	2.25	2.15
Washed			
No. 1	3.50	.....	.....
No. 2	3.50	.....	.....
No. 3	3.00	.....	.....
No. 4	2.75	.....	.....
No. 5	2.50	.....	.....

Williamson and Franklin County rate is 72½c. Other fields, 57½c.

Northwestern Markets

SEATTLE, WASH.

Advance of 50c. made on all coals. Some localities unable to secure quotations of any sort.

An advance of 50c. a ton on all coal in this city marks the commencement of high prices for the coming winter. Prices now are higher than at any similar period in the history of the business and higher than they were last winter. Ordinarily at this time prices are low enough to warrant consumers storing winter coal but this is not now the case and it is not evident that any movement for storing winter coal has started. Recent increases in miners' wages, scarcity of labor with lower production and the fact that no Canadian coal is being imported and greater demand being made for coal owing to the phenominal rise in the cost of fuel oil, all contribute to the rise in prices.

Waterville was only able to obtain one bid for coal this year and contracted for 150 tons of Waingate steam coal at $8 per ton, the highest price ever paid in eastern Washington. No bids were received recently in answer to an advertisement for the supply of coal for Whitman County during the next twelve months. Only one bid, that of the St. Paul & Tacoma Lumber Co., was received by Benton County for the supply of coal for the ensuing year. The prices quoted were: Roslyn lump coal, $6.30; mine-run, $5.80, and special steam, $5.30.

PORTLAND, ORE.

City receives only one bid on annual supply and this does not guarantee delivery. Prices much higher than last year.

In answer to an advertisement for the annual supply of coal for the city but one bid was received where last year there were more than seven. The prices quoted were: Tono lump coal, $7 per ton, Carbon Hill fire engine coal $12 per ton, Carbon Hill steam coal, $8 per ton. Contracts will not be taken by any coal company for any coal on specified amounts or delivery nor will a price be guaranteed for more than ten days, emphasizing shortage and an unstable market with the prospects that prices which are now higher by from 50c. to $1.50 a ton than at this time last year will go even higher. Very little coal is being shipped into Portland and as this city formerly received large consignments from Australia, which has ceased all shipments during the war, the situation as regards supply let alone price is not the most reassuring.

NEW WESTMINSTER, B. C.

Coal takes another advance and sells for higher prices than last winter. Prospects for serious coal shortage.

For the second time this summer the price of coal has advanced $1 a ton and is now $1.50 a ton higher than it was last winter with the prospects that it will go much higher and that later in the year it may be unobtainable at any price. Lump coal is now selling at $9 per ton and nut coal at $8 per ton. Nut coal was being sold four months ago at $6 per ton. Dealers are far behind in deliveries, one of the largest companies being over 100 tons behind on retail orders alone. The reason for the advance in the retail price is of course that the mines have advanced their figures because of the scarcity of labor. The mines are not exporting as much as formerly and there is a much greater demand for steam coal than ever before. The Admiralty is drawing heavily on British Columbia mines and these orders take precedence over all others.

BOISE, IDAHO

Shortage more serious than it has ever been with little promise of improvement. Demand greater than ever before with prices higher. Use of sagebrush for fuel urged.

A circular letter sent out over the name of J. A. Reeves, general freight agent for the Oregon Short Line, which handles most of the coal from the Utah mines consumed in this state, calls attention to the fact that the coal situation is far more serious than it has ever been in this section with little promise of improvement. The state normally consumes about 400,000 tons of coal a year, and while the Short Line shipped more coal during last May than in May, 1916, the rate will not come anywhere near supplying the demand. Only 353 tons of coal were shipped into the state between May 29 and June 8. State War Secretary J. Hansen is remaining in Utah to keep coal cars moving, but in a letter to the Governor states that it will be absolutely impossible to supply the demand and hints at a coal famine this winter. As a result prices are going out of sight and paradoxical as it may seem, some of the leading coal dealers are advising their patrons to burn sagebrush as much as possible, to use straw for the threshing of all grain, and to practice economy in the use of coal in the homes.

General Statistics

ANTHRACITE SHIPMENTS

The shipments of anthracite for June, established a new record in the history of the region. Mine and washery operations were both pushed to the limit of the supply of labor and of railroad cars and they responded by a record-making tonnage of which the railroad shipments amounted to 7,049,037 tons, an increase over the preceding month (which in turn had been the maximum May record) of 131,512 tons. This is the first time in the history of anthracite mining that the shipments have exceeded 7,000,000 tons.

Distributed by carrier companies the shipments during June were as follows:

	June 1917	June 1916	Year 1917	Year 1916
P. & R.R. W.	1,341,370	1,087,183	7,177,908	6,322,998
L. V. R.R.	1,347,205	1,000,553	6,741,996	5,830,559
C. R.R. of N. J.	771,365	633,572	4,073,044	3,447,585
D. L. & W. R.R.	1,085,072	873,278	6,132,890	5,106,958
D. & H. Co.	818,337	580,046	4,110,640	3,559,974
Penna. R.R.	500,037	482,239	2,836,233	3,069,431
Erie R.R.	807,047	666,529	4,371,476	4,013,663
N. Y., O. & W. R.W.	181,965	154,089	1,000,412	979,848
L. & N. E. R.R.	335,602	261,711	1,819,864	1,192,874
	7,188,000	5,739,200	38,264,463	33,523,890
*Deduction	* 138,963	* 102,225	* 597,370	* 102,225
	7,049,037	5,636,975	37,667,093	33,421,665

*Deduction: Tonnage reported by both C. R.R. of N. J. and L. & N. E. R.R.

Compared with June, 1916, the shipments last month showed an increase of 1,412,062 tons, or 25 per cent. The largest previous shipments were made in March of this year, when the quantity sent to market was 6,989,075 tons. Total shipments for the first six months of 1917 have amounted to 37,667,093 tons, against 33,421,665 tons in 1916, and 32,328,991 tons in 1915.

This record, made in spite of a pronounced shortage of labor, exceeds the most optimistic anticipations and more than keeps the promise made by the operators to the Federal Trade Commission that the production in 1917 would be increased over 1916, and that the public requirements would be supplied.

NORFOLK & WESTERN

Destination of shipments over this road for May and the first five months of last year and this year were as follows, in short tons:

Coal	May 1916	May 1917	Five Months 1916	Five Months 1917
Tidewater				
Foreign	314,057	140,760	1,307,905	1,010,989
Coa'wise	281,389	295,414	1,570,540	1,340,549
D'm's't'c	2,534,141	2,508,220	11,170,189	11,055,154
Coke				
Foreign	7,613	1,511	25,069	16,844
Domestic	175,756	207,469	871,835	999,439
Total..	3,312,956	3,153,374	14,945,538	14,422,975

Foreign Markets

GREAT BRITAIN

June 28—In some isolated cases collieries have been better situated with regard to supply of tonnage and wagons, but, generally speaking, the trend of the market has been easy, and prices inclined to sag. Prices quoted are nominal.

Best Welsh steam	Nominal
Best seconds	Nominal
Seconds	$6.72@6.96
Best dry coals	6.00@6.24
Best Monmouthshires	6.72@6.96
Seconds	6.00@6.24
Best Cardiff smalls	4.32@4.56
Cargo smalls	3.84@4.20

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Mommouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—There is still not enough tonnage to go round, and rates of freight in all directions rule very high.

Gibraltar	$21.60	Port Said	$33.60
Marseilles	21.54	Las Palmas	18.00
Genoa	24.30	St. Vincent	19.20
Naples	23.58	River Plate	26.40
Alexandria	33.60		

The Board of Trade returns for May show that the tonnage of the coal, coke and patent fuel exported during that month and the first five months of 1915, 1916 and this year was as follows:

	1915	1916	1917
May	3,967,657	3,825,387	3,664,823
First five months	19,651,751	17,000,732	15,795,303

The values for the same periods are shown in the next table:

	1915	1916	1917
May	£3,542,975	£4,790,460	£4,909,384
First five months	15,416,600	18,551,184	20,963,021

The average value of the coal, coke and patent fuel exported during May was £1 6s. 9d., as compared with £1 5s. in May, 1916.